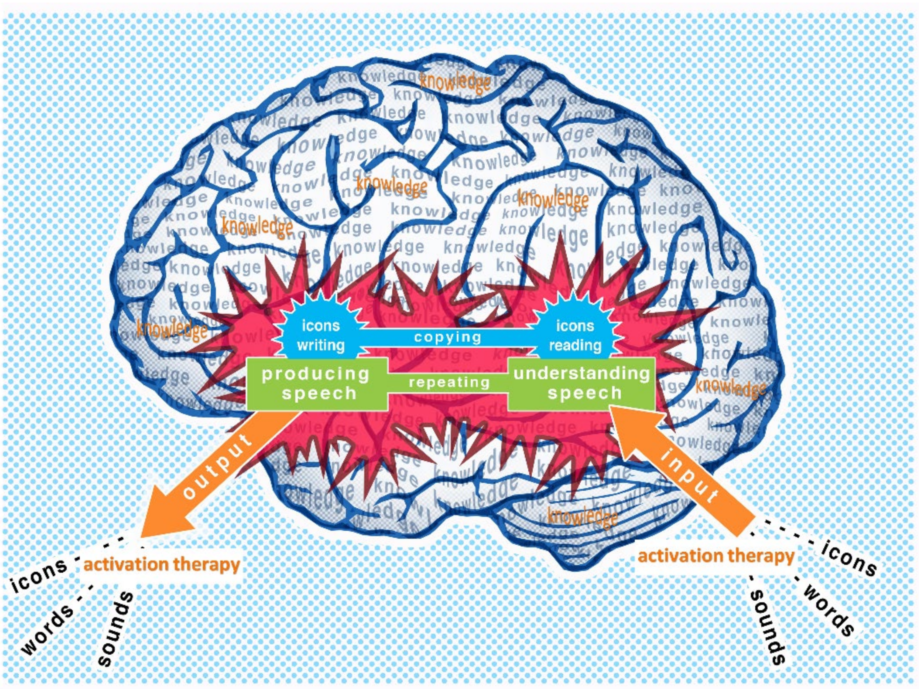
A mixed method investigation into the impact of activation therapy with and without word finding for people with aphasia



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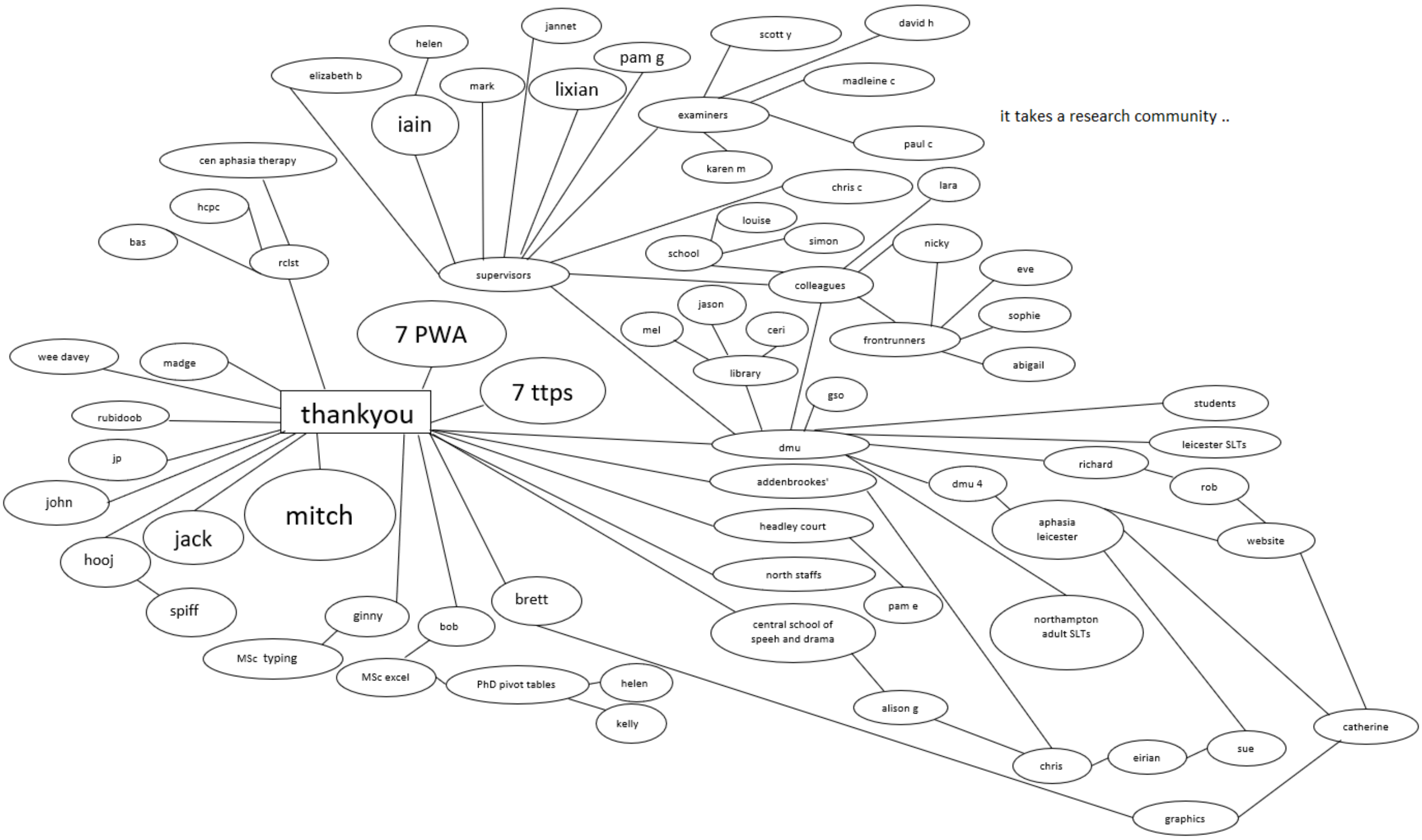

Abstract

Background Information

Impairment based therapy studies for people with aphasia indicate that therapy which involves word finding practice can help people with aphasia find words. Research has also suggested that the impact of therapy can generalise to other words not used in therapy and that it can have a positive impact on communication skills and feelings of wellbeing. This research project introduces a novel word finding therapy. Activation therapy was designed for people with all types of aphasia, even those who have difficulty representing their own views or cannot express their thoughts at all. There is very little evidence base to support a word finding therapy that does not involve overt word finding practice and this limited support is based on the results of three separate therapy studies and its beneficial impact on the word finding skills of five people with aphasia. This therapy trial compared the impact of activation therapy with and without word finding to see if its impact was contingent on the opportunity to practise word finding out loud. It was also designed to evaluate two additional therapy outcomes; the impact of activation therapy on sentence grammar and its impact on the experience of living with aphasia.

Methodology

This research was designed to conform to therapy trial standards as far as practicable. Seven people with aphasia and their therapy trial partners volunteered to participate in this study. All participants had suffered a left sided cerebrovascular stroke and were at least nineteen months post onset of their aphasia. Participants were diverse in terms of aphasia severity, type of aphasia, age, and pre stroke occupation, however they were all united in their need to receive more aphasia therapy than they had been offered. ttps were related to participants in different ways and were either spouses, partners, parents or the offspring of the seven participants with aphasia.

The research design was informed by aphasia therapy trial precedents and followed an “a b a c a” design. Participants were provided with three pre therapy assessment sessions, six activation therapy with or without word finding sessions, three mid therapy assessment sessions, a further six

sessions of activation therapy with or without word finding, and finally three post therapy assessments. Random allocation to counterbalanced pathways, verification of stable baselines, and three types of control tasks were used to address possible threats to the integrity of the crossover research design.

Participants completed three 260 word finding assessments in each assessment phase. Participants and their therapy trial partners were also interviewed during each assessment phase. Assessments of sentence comprehension and non-verbal problem solving were conducted during pre and post therapy assessment phases and were used as two of the control measures from which the impact of activation therapy could be inferred. Initial word finding assessments were used to identify words which had caused word finding difficulties. For each participant, the words that they had found difficult to say were allocated to one of three equivalent word finding sets, activation therapy with word finding set, activation therapy without word finding set and a control group set.

During activation therapy sessions participants listened to the therapist describing each word. Descriptions included at least eight relevant pieces of information about the word. Its appearance, function, most obvious feature, location, category membership, co-ordinates, closely related objects, synonyms, antonyms, subtypes, parts, use in collocations, use in idioms, use in frequent sentences and idiosyncratic associations. Participants were then asked to identify the object that had just been described from an array of five pictures that contained the target picture and four of its coordinates. The only difference between the two activation therapy techniques was that activation therapy with word finding sessions included participants practising saying the word that had just been described and participants were provided with the opportunity to practise saying the word eleven times before listening to the description of the next therapy item.

Results

Statistical analysis of group results suggested that activation therapy improved the word finding skills of the seven participants with aphasia. A lack of comparable improvement in control tasks suggested that improved word finding skills could be attributed to activation therapy rather than other possible factors such as improved attention, executive functioning, therapeutic alliance or other non-specific effects of attending Speech and Language Therapy sessions. There was however, no statistical difference between the impact of activation therapy with word finding and activation therapy without word finding, suggesting that spoken word finding practice was not an essential part of successful word finding therapy.

Grammatical analysis of word, phrase and sentence level output elicited during therapy experience interviews identified only one indicator of the generalisation activation therapy to everyday speech. All seven participants used longer noun phrases after twelve weeks of aphasia therapy. Finally, thematic analysis therapy experience interviews with participants and their therapy trial partners suggested that activation therapy had resulted in positive perceptions of changes in language use and participants' relationships with themselves, their close others and their interactions with people in the wider community, the other others. Triangulation and integration of these findings suggested that activation therapy may have altered the accessibility of nouns and noun syntax which was apparent in word finding assessments and spontaneous language use.

Discussion

This small scale therapy trial supports the implementation of aphasia therapy for people who are not happy living with their aphasia. Three complementary evaluation methods identified the meaningful impact of activation therapy in improved word finding in assessments, improved noun phrase structure, and enhanced wellbeing, a triangulation and integration of converging evidence. In this therapy trial, changes in word finding skills could not be attributed to overt word finding practice. The need to practise words is a notion that has guided aphasia therapy research and has framed the way that outcomes have been measured in this field. It has also dictated the type of participant that can take part in research and by implication has affected which type of person with aphasia can be provided with intervention that is evidence based.

The equal impact of activation therapy with and without word finding on the words analysed in this therapy trial can be explained by both prominent models of single word processing, interactive

and modular. Analysis of meaning word finding difficulties and generalisation to words not targeted in therapy aligned more closely to the interactive models of conceptualisation of single word processing. Neither model adequately explained the overuse of plural markers and relative lack of sound processing difficulties experienced by the seven participants in the study. It is hoped that the findings of this small scale therapy study may contribute to future discussions about the nature of word finding with and without aphasia. It is also hoped that it this study will contribute to the evidence base that supports the implementation of aphasia therapy for those who live with language difficulties.

Chapter 4 Word Finding Assessment Results

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Appendices

Chapter 1 Introduction

Impairment based therapy studies for people with aphasia indicate that therapy which involves word finding practice can help people with aphasia to find words. Research has also suggested that the impact of therapy can generalise to other words not used in therapy and that it may have a positive impact on communication skills and feelings of wellbeing. This research project introduces a novel word finding therapy. Activation therapy was designed for people with all types of aphasia, even those who cannot talk. There is very little evidence base to support a word finding therapy that does not involve overt word finding practice. The limited support for therapy without word finding is based on three previous research studies and the impact of therapy on five people with aphasia (Bixley, 1998; Morris & Franklin, 2012; Nettleton & Lesser, 1991). This present therapy trial compared the impact of activation therapy with and without word finding to see if its impact was contingent on the opportunity to practise word finding out loud. It was also designed to evaluate two additional therapy outcomes, the effect of activation therapy on sentence grammar and its effect on the experience of living with aphasia.

1.1 Literature Review Chapter 2

Chapter 2 describes the theory and evidence base which underpins noun word finding therapy for people with aphasia. The next part of this chapter introduces the frameworks that are used to conceptualise the different ways of thinking about aphasia intervention (World Health Organisation, 2017). Within this chapter, different approaches to aphasia therapy are described (Bose et al., 2019; Boyle & Coelho, 1995; Linebaugh & Lehner, 1997; Morris and Franklin, 2012; Robson et al., 1998; Weigl, 1961). The rationales used to underpin their application and the evidence to support their implementation are critically evaluated. The relevance of model appropriate therapy (Hillis, 1989; Nettleton and Lesser, 1991; Whitworth et al., 2005) is addressed from the perspective of the two competing ways of thinking about single word processing, modular (Levelt, 2001; Levelt et al., 1991) and interactive (Dell & O'Seaghdha, 1991; Schwartz et al. 2006). The semantic phonological therapy divide is shown to be more complex than is universally acknowledged (Wisenburn & Mahoney, 2009). The evaluation of both types of therapy is complicated by whether participants are presented with whole word (Weigl, 1961) or part word stimulation (Patterson et al., 1983) and whether intervention is provided over a period of weeks (Best et al., 2013) or is the result of a single stimulus response intervention (Howard et al., 1985c).

Studies that have researched into the impact of aphasia therapy could be criticised because they use word finding as both part of the research process and as a way of measuring its impact (Bixley, 1998; Nickels, 2002). A very limited set of three studies, involving successful semantic therapy for five out of nine participants, attests to the relevance of therapy without word finding (Bixley, 1998; Morris & Franklin, 2012; Nettleton & Lesser, 1991). This present study was designed to investigate the impact of a new type of therapy, activation therapy, and to compare the impact of activation therapy with and without word finding.

1.2 Methodology Chapter 3

Chapter 3 introduces the methodology used in this therapy trial. Seven participants with aphasia and their therapy trial partners volunteered to take part in this “a b a c a” exploratory therapy intervention study. Detailed initial assessments allowed predictions to be made about which participants would benefit from therapy and it also allowed selection of carefully matched therapy materials. Initial assessment also allowed the collection of the three different within subject control measures which would be used to infer whether activation therapy had affected participants’ word finding skills or improvements could be attributed to non-specific improvements in brain function.

This methodology chapter will provide rationales for the design of the study that are based on the aphasia literature. In this three times repeated measure, two therapy technique counterbalanced crossover therapy trial, participants were stratified according to aphasia severity and then randomly allocated to one of two therapy pathways. This design was used to investigate the impact of activation therapy and also to compare the impact of activation therapy with and without spoken word finding. The methodology chapter will describe the way in which activation therapy was delivered to the seven participants and will highlight the way in which the two activation techniques were exactly the same except for the opportunity to practise spoken word finding. Participants were encouraged to practise word finding in activation therapy with word finding sessions, whereas in activation therapy without word finding sessions, they did not practise word finding at all.

The impact of activation therapy was measured in three independent but complementary ways. Word finding assessment results were combined with grammatical analysis results and thematic analysis findings to assess the multifaceted impact of impairment based activation therapy. Each of the three results chapters presents information relevant to one particular evaluation method, either word finding assessments, grammatical analysis or thematic analysis. These chapters include information about the method itself, the rationale for its use, the way in which the data were analysed, justification for these choices, what the data analysis suggested, and the limitations of each method.

1.3 Word Finding Assessment Results Chapter 4

Three 260 word finding assessments were conducted during each assessment phase of the therapy trial, a1, a2, and a3. These assessments were used to measure the overall impact of activation therapy and to investigate the impact of the two types of activation therapy, activation therapy with and without word finding. This was achieved by selecting and comparing the impact of therapy on three comparable sets of words. One that would receive activation therapy with word finding, one that would be used in activation therapy without word finding and one set that would not receive any therapy at all. The effect of therapy was also achieved by comparing word finding skills to two other control tasks, The Test for the Reception of Grammar (Bishop, 2003) and The Standard Progressive Matrices (Raven, 2006). Statistical analysis was used to compare the impact of word finding therapy for the seven participants in the trial. The discussion about the results of this part of the study focusses on locating the results within the current impairment based therapy literature and examining how well the results fit with theories of single word processing. The discussion also highlights where they do not.

1.4 Grammatical Results Chapter 5

Therapy experience interviews served two functions in this study. The first function was to allow the collection of a spontaneous language sample from the seven participants that could be used for grammatical analysis. The second function was to enable thematic analysis of the experience of participating in the activation therapy trial. In the grammatical results chapter, comparable segments of a1, a2 and a3 therapy experience interviews were analysed and compared (Crystal, 1982). The choice of grammatical analysis over any of the other theoretically possible methods will be justified with reference to a lack of consensus about how to measure the spontaneous talk of people with aphasia and the relevance of grammatical analysis to everyday clinical practice.

1.5 Thematic Analysis Findings Chapter 6

Thematic analysis (Braun and Clarke, 2006) was used to analyse the therapy experience interviews and conducted with participants and their therapy trial partners within each assessment phase, a1, a2, and a3. Interviews were analysed to arrive at a thematic map that could explain the way in which participants with aphasia and their therapy trial partners had experienced the activation therapy trial. It was important that interviews were conducted using questions that stimulated talk about therapy, rather than asking participants and their therapy trial partners for their opinions about pre-determined topics chosen by the researcher. Interview analysis focussed on the creation of a thematic map that represented the impact of activation therapy on participants and their therapy trial partners. The final part of chapter 6 will focus on triangulating and integrating the findings of the three methods used in this study and will identify where a combination of the data sources may allow a greater understanding of the impact of activation therapy for the seven participants and their therapy trial partners.

1.6 General Discussion and Conclusions Chapter 7

This final chapter starts with a summary of the key findings from the three results chapters and highlights the positive outcomes that resulted from activation therapy that included improved word finding skills, longer noun phrases, improved language use and improved relationships with self, close others and other others, and improved access to nouns and noun syntax. The chapter will also raise discussion points that were common to all three results chapters. The final part of the chapter will suggest ways in which this research project could be extended to other research activity. It will summarise the original contributions to knowledge and the concluding section will highlight the way in which activation therapy and the findings of this small therapy trial might inform current clinical practice. Finally the thesis will concluded with a final summary and will highlight the ways in which activation therapy was relevant for the seven people with aphasia and their therapy trial partners who participated in this preliminary exploratory research.

Chapter 2: Aphasia therapy

2.1 Introduction to Chapter 2

Aphasia has been defined by many different authors (McNeil & Pratt, 2001) and different research genres highlight how much aphasia affects every aspect of life. What follows will introduce a holistic understanding of what the term aphasia encompasses and will describe aphasia using the four parameters outlined by the World Health Organisation (2017) to organise that definition. The resultant explanation will include brief descriptions about aphasia classification, language function, impact on the person, their activity and participation and finally the way in which the environment can be adjusted to support communication with people with aphasia (PWA).

The second part of this chapter presents an overview of aphasia therapy, first by reviewing what is already known about how to conduct aphasia therapy and then by reviewing the evidence for semantic and phonological therapy approaches. The chapter will critically evaluate differences between these therapy techniques and will place activation therapy within the context of the majority of aphasia research that uses word finding practice within therapy (Best., 2013; Howard, 2000; Nickels, 2002) sessions. It will conclude by examining the theoretical underpinnings for activation therapy and explain the rationale for the current original study which was designed to investigate and compare the impact of activation therapy with and without word finding. The chapter will conclude with a summary of the aims and objectives of this research project and align these with relevant theory that underpinned the conception of this project.

2.2 Defining aphasia

2.2.1 *The World Health Organisation and the National Health Service*

The World Health Organisation (2010) has difficulty classifying aphasia. In its 2010 classification, aphasia was classified three times as a consequence of circulatory disease (9, 169), as dysphasia and aphasia excluding progressive aphasia (18, R47, 47), and as a problem with reading and other symbolic functions (18, R47, 48). In a more recent iteration of their international Classification of Diseases (2018) aphasia was also entered in three places as dysphasia (MA80.1), anomia (MB4B.4) and as eleven different types of aphasia (MA80.0). These triple entries signal the difficulty that is inherent in classifying the cause of aphasia, the stroke, and the consequence of brain damage, aphasia, within the same classification system. It also hints at the complexity involved in defining aphasia. For the purposes of this review of the literature this bodily structure dimension will be used to define an element of what aphasia is, a symbolic language difficulty acquired as a consequence of a single hemisphere, usually dominant, cerebrovascular event and not as part of an ongoing progressive problem such as dementia.

The National Health Service (2019) separate and record strokes by the way that they were caused and suggest that 85% of strokes are caused by cerebral infarction and 15% of stokes result from cerebral haemorrhages. Aphasia happens because both types of stroke cause cortical hypoperfusion and areas of the brain responsible for language processing are deprived of their typical blood flow (Hillis & Heidler 2010; Hillis et al., 2002). Bamford et al. (1991) suggested that cerebral infarction produces four different types of strokes and these can be classified according to which part of the brain's circulation was affected by the stoke: total anterior ciculation infarct, partial anterior circulation infarcts, posterior circulation infarcts and lacunar infarcts. Bamford et al. (1991) and more recently (Plowman et al., 2012) have suggested that the type of stroke a person with aphasia experiences could predict functional outcome. Total anterior circulation infarcts and deep perforating artery infarcts are associated with substantial long term disabilities and patients with partial anterior ciculation infarcts or posterior circulation infarcts are more likely to to have an early recurrent stroke. Total anterior ciculation infarcts and left partial anterior circulation infarcts are most relevant to people who are interested in studying aphasia because they affect the parts of the brain where language function is thought to be localised.

According to last performance data sets that were collected by National Health Service England (2019) in 2013, 19,710 people in England were admitted to hospital following a stroke between January to March 2013. Pederson et al. (1995) estimated that 38% of these people would be diagnosed with acquired aphasia immediately following their stroke and 18% would encounter difficulties using language at discharge. This means that in 2012/2013, 29,960 people with aphasia needed the support of a Speech and Language Therapist during the acute stage of their recovery and 14,191 people with aphasia needed ongoing aphasia support after discharge. A more recent study by Mitchell et al. (2020) investigated the data derived from the near real-time Sentinel Stroke National Audit Programme, England, Wales and Northern Ireland for July 2013 to July 2015. The programme has been in place for 15 years and aims to audit the structure, process and outcome of stroke care to improve the way in which it is delivered. Mitchell et al.'s (2020) study identified that from a data set of 88, 974 stroke survivors, 41% experienced post stroke aphasia and 76% of these PWA required Speech and Langauge intervention. These studies suggest that the National Health Service has an ongoing need to address and provide care for people with aphasia post stroke, both in the acute stages of recovery (Mitchell et al., 2020) and long term when they have been discharged into the community (Pederson et al., 1995).

2.2.2 Language

Aphasia results in difficulties understanding and producing all forms of language. The term language includes both being able to understand what is being conveyed and being able to represent thoughts expressively to others. Hughlings Jackson (1864 cited in Taylor, 1958) and Henry Head (1926) described aphasia as a difficulty with symbolic communication and affects all forms of symbolic interaction including spoken, written and symbolic gestural communication. Aphasia affects all language modalities whether it is vocal modality or not. In describing aphasia, Darley (1972) referred to four language modalities: visual recognition, auditory processing, reading, speaking and writing. More recently authors have included symbolic gestural communication as an additional modality (Jordan and Kaiser, 1996). Aphasia affects the ability to use internal and external language (Head, 1926; Hughlings Jackson, 1864, cited in Taylor, 1958). It impacts on the ability to conjure up inner speech and use it to rehearse words, ideas or phrases (Head, 1926; Hughlings Jackson, as cited in Taylor, 1958; Levelt et al., 1999, Wise et al., 2001). In summary, aphasia affects the comprehension and expression of all language modalities and affects internal and external language processing.

Traditionally linguistic models sub divide language into five separate but interacting components (Crystal, 1982, 1987): phonetics and phonology (sounds), morphology (structure and parts of words), syntax (sentence grammar), semantics (knowledge) and pragmatics (language use in a social context). As aphasia affects the ability to use language it could be described as a problem with phonetics, morphology, syntax, semantics (Darley, 1972; Weigl & Bierwisch, 1970) and pragmatics (Holland, 1991; Prutting & Kirchner, 1987). People with aphasia experience difficulties with one, some or all of the five components of language although Holland (1991), amongst others, would argue that the pragmatic skills of PWA appear to be less affected than accessing sounds, words and grammar.

2.2.3 Language and Cognition

What constitutes the relationship between language and cognition is a complex field of study and it is perhaps significant that some authors who write about the links between language and cognition do not define the concept of cognition (Fonseca et al., 2017; Marinelli et al., 2021). For example, Baldo et al. (2015) focus on the link between problem solving and cognition, Nikravesh et al., (2021) focus on the links between language and working memory and Kalbe et al. (2005) investigate the relationship between aphasia and memory, attention and reasoning. Some authors have suggested that cognition and language are inextricably linked and impaired language means that the person will have impaired cognition (Murray, 2012). Others have identified that linguistic severity does not correspond to cognition and, that the two skill sets can be separated (Helm Estabrooks et al., 1992; Marinelli et al., 2017). Other authors suggest that the impact of aphasia can be exacerbated by impaired cognition (Kalbe et al., 2005) and impaired language and cognition is associated with less positive outcomes (El Hachioui et al., 2014). At present, these studies suggest that the link between aphasia and cognition can theoretically be separated but so far, the way in which they are interdependent is not clear (Fonseca et al., 2017 p.127).

If cognition is construed as what we know (Bates, 2001) and any way in which sensory input is processed (Neisser, 1967), cognition can be conceptualised as the summation of, at least, attention, executive functions, language, memory, and visuospatial knowledge (Helm Estabrookes, 2002) and the processes that operationalise them. In the field of aphasia therapy, the language processing skills of PWA are often disproportionately affected when compared to the impact of brain damage on other cognitive domains (Darley, 1972; Simmons-Mackie & Kagan, 2007). It is recognised that PWA are able to communicate better than they talk (Holland, 1991) and, PWA interact more effectively than their linguistic difficulties might predict (Fucetola & Connor, 2015).

For example, a trained philosopher described what he called “the worm’s eye view” (Alexander, 1990 p.1). In his paper describing severe aphasia ten years post onset, Alexander (1990) described the underlying competence he experienced as a person with aphasia. He suggested that concepts existed within his mind without language, in a way that language could not exist without concepts. His contention was that PWA lost the facility of language (the performance), not the conceptual understanding (the competence) “in terms of the aphasic patient, the ideas, cognitions, understanding, meaning, semantics, thoughts, memories and reasons come first, language comes second.” Alexander (1990, p. 3).

He illustrated this point when he stated that he could produce a cutting action when he was unable to find the word for knife and therefore he argued, re-teaching the concept knife was unnecessary.

He also suggested that the ability to interact with others and obey all of the implicit rules of interaction demonstrated that PWA operate at a far higher cognitive level than that suggested by their inability to find single words. This anecdotal evidence supports that premise that language, and in this case that memory of the concept knife and the attention, visuospatial and executive functions associated with social interaction, were differentially affected by stroke.

This proposition is supported by the localisation of function evidence described in Butler et al.'s (2014) study in which they used principal component analysis to examine brain functioning in 31 PWA. The researchers found that language and cognitive executive functioning were processed in different parts of the brain. Their study suggested that phonological processing was related to activity within the left posterior peri sylvian regions and semantic processing was related to activity within the left anterior middle temporal gyrus and the underlying temporal stem, whereas executive cognition function was not related to functioning within any specific part of the brain. Campbell and Tyler's paper (2018) also argues for the independence of frontotemporal syntax processing and contends that it can be separated from generalised executive functions, attention and memory.

Other research suppports an alternative viewpoint. Research also suggests that the impact of aphasia can be exacerbated by impaired cognition (Kalbe et al., 2005). Impaired language and cognition is associated with less positive outcomes (El Hachioui et al., 2014). It limits the potential for active rehabilitation (Lambon Ralph et al., 2010) and the ability to use technology to assist communication (Nicholas et al., 2011). This premise is supported by research that suggests that PWA with verbal short term memory (Dignam et al., 2017), attention (Yeung & Law, 2010) and visuospatial working memory (Harnish & Lundine, 2015) had difficulty responding to aphasia therapy intervention.

PWA who cannot use self-cueing strategies to help themselves find words provide additional support for the premise that there is a link between impaired language functioning and impaired cognition (Kiran, 2016). In Lowell et al.'s (1995) study, 1 out of 3 participants was not able to use self-cueing to support their word finding. The authors concluded that the participant who could not self-cue demonstrated impaired non-verbal cognitive skills and therefore the inability to self-cue may be linked to a lack of cognitive ability. Furthermore, in Nickel's (2002) single participant therapy study, her participant JAW was unable to learn how to blend sounds to create a word, and the 20 participants in Bruce and Howard's (1998) study could not use a three step first sound self-cueing system. Beckley et al.'s (2013) study also concluded that their single participant could not implement conversational maintenance strategies because of a lack of cognitive flexibility.

A different aspect of this field of enquiry is that language can help cognition and is essential for abstract thought and reasoning (Baldo et al., 2015). PWA, like people without aphasia, may need to use language to help them attend to stimuli and ignore other stimuli. They may need language to rehearse and remember information, problem solve, synthesise, integrate information and help to succeed in tasks that require visuospatial skills. What (Fonseca et al., 2017) might refer to as linguistic mediation and without language, these supporting cognitive functions may be poorer because they do not have language to help them.

There is also some evidence to suggest that it is conceptually quite difficult to test language and cognition separately (Duffy & Watkins, 1984; Nikravesh et al, 2021; Wall et al., 2017). This is because of the role linguistic mediation in abstract thought (Fonseca et al., 2017). Helm Estabrooks (2002) suggested that the notable exception to the difficulty in using a test of cognition that did not require language for its implementation was Raven's Progressive Coloured Matrices (Raven, 1995). This assessment investigated visual analogic thinking and had been seen to have practically no correlation with language abilities (Basso et al., 1973; Helm Estabrooks, 2002). This assessment is readily available to Speech and Language Therapists (Helm Estabrooks, 2002) and if indeed, successful visual analogic thinking does not rely on the integrity of language skills, it may be a productive assessment to use when investigating the relationship between language therapy and cognition.

In summary, some authors have suggested that cognition and language are inextricably linked and impaired language means that the person will have impaired cognition (Murray, 2012) and others have identified that linguistic severity does not correspond to cognition and that the two skill sets can be separated (Helm Estabrookes et al., 1992; Marinelli et al., 2017). Some but not all, evidence appears to suggest that language can be damaged independently and to a greater degree to other cognitive functions. In this unequal relationship, impaired general cognitive function may have a negative impact on language processing and conversely, impaired language processing may have a negative impact on the functioning of other cognitive domains. Authors seem to agree that it is possible that PWA could have associated difficulties with attention, executive functions, memory and visuo-spatial processing and reporting a measure of these functions before and after language intervention may help aphasiologists uncover more about how language and cognition interact (Fonseca et al., 2017; El Hachioui et al., 2014; Helm Estabrooks, 2002).

2.2.4. Impact of Aphasia on the Person, Their Activity and Participation

The loss of language function has an impact on the person with aphasia (PWA) and research that has been derived from people living with aphasia (Brown et al., 2010; Cruice et al., 2010; Hoen et al., 1997; McLellan et al., 2013; Mumby & Whitworth, 2013; Parr et al., 1997; Van der Gaag et al., 2005) suggests that PWA feel that they are competent individuals (Alexander, 1990; Barrow, 2008; Hinckley, 2006; Hoen et al., 1997; McLellan et al., 2013), but having aphasia affects confidence (Manning et al., 2019; Moss et al., 2021; Van der Gaag et al., 2005), feelings of self-worth (Hinckley, 2006; Moss et al., 2021; Parr, 1997) and identity (Moss et al., 2021). Research also suggests that PWA have to cope with, and overcome negative emotions associated with their aphasia (Barrow, 2008; Cruice, et al., 2010; Hinckley, 2006; Hoen et al., 1997; Le Dorze et al., 2014; Mumby & Whitworth, 2013; Worrall et al., 2016; Wray et al., 2018), but they demonstrate a determination to engage (Grohn et al. 2014; Le Dorze et al., 2014; Manning et al., 2019; Moss et al., 2021; Wray et al., 2018) and take control (Wray et al., 2018) of their future selves. It has been suggested that PWA have to reconstruct a view of themselves post stroke (Brown et al., 2010; Corsten et al., 2014; Manning et al., 2019; Shadden, 2005) and Mc Menamin et al. (2015), suggested that it was clear that aphasia has a substantial detrimental impact on the person living with aphasia.

Aphasia not only affects the life of the PWA, it also impacts on the lives of those who live with them. McLellan et al. (2013) described how aphasia changes relationships with significant others because PWA rely heavily on of family members (Hoen et al., 1997; Manning et al., 2019; Tomkins et al., 2013; Van der Gaag et al., 2005; Wood et al., 2010), and their significant others have to take on new roles and responsibilities (Winkler et al., 2014). Because of this burden of caring (Moss et al., 2021), aphasia has been referred to as a third party disability (Grawburg et al., 2019). Brown et al.'s (2011t) research suggested that families, as well as PWA, are at risk of suffering negative emotions as a consequence of living with aphasia. Worrall et al. (2016) suggested that aphasia should be conceptualised as a family problem (Worrall et al., 2010) in which the needs and wishes of relatives should be considered a fundamental part of therapy planning (Berg et al., 2016; Worrall et al., 2011).

Aphasia significantly affects the lives of PWA and their significant others. Aphasia has an impact on the PWA being able to access a daily routine and fulfil their social roles (Moeller and Carpenter, 2013). Aphasia prevents people from carrying out day to day activities (Brown et al., 2010; Hoen et al., 1997; McLellan et al., 2013; Niemi & Johansson, 2013; Parr et al., 1997; Van der Gaag et al., 2005). Research suggests that PWA need activity (Cruice et al., 2006; Manning et al., 2019; Wray et al., 2018), but as Brown et al. (2010; 2011t; 2011i; 2012) suggested, having meaningful activity post stroke was difficult to achieve. Wood et al. (2010) suggested that PWA needed to adjust their expectations and create a meaningful role for themselves in their new reality (Doughty Horn et al., 2016), and this may include a restricted life in which PWA support their families (Manning et al., 2019) by doing housework (Wray et al., 2018).

Aphasia also has an impact on the ability to interact with others in shared activities and in the community. Wray et al. (2018) suggested that although PWA need to have positive relationships with their friends (Azios & Damico, 2020; Grohn et al., 2012; Moss et al., 2021; Northcutt et al., 2016) aphasia affects their ability to create and maintain social support and this means that they have fewer friends than they had before their stroke. PWA also report difficulties with interaction outside the home (Dalemans et al., 2010; Le Dorze et al., 2014; Wray et al., 2018). Community interaction resulted in PWA feeling stigmatised (Wray et al., 2018) and disenfranchised (Hammel et al., 2008). Hersh et al. (2016) suggest that people often find it easier to avoid having a conversation with PWA.

2.2.5 *Adapting the Communicative Environment*

If one construes participation at home and in the community as a right (Hammel et al., 2008) and communication as an interaction between two people who have an equal responsibility to ensure that it is successful (Grice, 1975), then PWA are not the only people who have to adjust their interaction to overcome the impact of aphasia on participation. Supported conversation (Kagan, 1995), also known as total communication (Byng et al., 2000), or multimodality communication (Rose et al., 2013a) is an environmental adaptation that enables PWA to express their views. Adaptations include conversation partners using visual analogue scales (Brumfitt & Sheeran, 1999), drawing, gesture, facial expression, pictograms and writing (Corsten et al., 2014) to supplement verbal interaction. For example, Brown et al. (2010) used large font size, illustrations, drawing, writing, gesture and verification questions made to engage with the 18 people with mild aphasia and seven people with moderate to severe aphasia who participated in their research. In 2012 Blom Johansson et al. reported that

> "Pen and paper, pictures, written keywords, gestures, facial expressions and drawings were used during the interviews to ensure that participants with aphasia understood the questions and had a means of responding (Kagan 1998). The questions were adapted to the language ability of the informants (e.g. the questions were occasionally rephrased to make it possible to answer yes or no or by pointing to a picture). When necessary, the interviewer also proposed ideas that the informant could reject or approve" Blom Johansson et al. (2012, p. 146).

Conversation partner schemes are training events where interested relatives (Simmons Mackie et al., 2016) and professionals (Wielaert et al., 2018) can be taught how to use these adaptations within everyday talk and remove the environmental communication barrier that PWA experience when they talk to others (Pound et al., 2018). Mc Menamin et al. (2015) reported the benefits of

PWA being involved as trainers in this type of training and suggested that the 5 PWA in their conversation partner study reported increases in confidence, independence and identity. Some people in the community already use some of the supported communication techniques intuitively when they talk to PWA (Larter & Bixley, 2009). Anglade et al.'s (2021) study examined how PWA engaged with people who work in pharmacies, shops, restaurants and other service industries and the authors identified the service industry workers accepted this form of non-verbal communication and worked with the PWA to collaboratively arrive at a mutual understanding of what was being communicated. This type of research suggests that some PWA have successful interactions within the wider community without any kind of training, however, a greater amount of research suggests that PWA have difficulty participating fully in their lives because they have language difficulties (Hinckley, 2006; Parr et al., 1997).

Aphasia specific support groups are another way of altering the environment to promote communication with PWA. These groups offer PWA the opportunity to attend a social occasion in a protected space (Attard et al., 2015; Manning et al., 2019). Hoen et al.'s (1997) research suggested that PWA of any age and time post stroke had benefitted from attending a long term community based group. They also reported that their participants felt less marginalised after participating in this type of scheme. These different strands of evidence collected from PWA (Cruice et al., 2010), their significant others (McLellan et al., 2013) and the professionals that they work with (Mumby & Whitworth, 2013) all suggest that communication with a PWA is challenging both for the person who has aphasia and for those that live with or interact with them.

In conclusion, post stroke aphasia can be described as a problem using language that encompasses all modalities of comprehension and expression, namely understanding speech, producing speech, reading, writing, understanding gestures and producing gestures. The five components of language, phonology, morphology, semantics, syntax, and pragmatics may be differentially affected but many PWA retain their pragmatic and cognitive skills and can interact with others despite having difficulty using sounds, words and grammar. The impact of language loss extends beyond the difficulty with language processing and encompasses interacting with others at home, at work and in the community. Environmental adaptations such as supported conversation techniques can help PWA participate in conversations and supportive spaces can provide safe spaces to talk, but the evidence suggests that living long term with aphasia is challenging and its impact extends beyond the individual.

2.3 Introduction to Aphasia Therapy

Aphasia therapy works directly on the language difficulty itself, to reduce its impact on interaction, communication and impairment focussed noun word finding therapy will be reviewed in what remains of this chapter. Aphasia therapy can be defined as any activity that focusses on enhancing the language skills of someone whose communication has been affected by brain damage. In 1972 Darley posed these three questions

> "Does language rehabilitation accomplish measurable gains in language function beyond what can be expected to occur as a result of spontaneous recovery? Or, stated differently, does therapy have a decisive influence on the course of recovery and the ultimate outcome? Are improvements in language behaviours worth the time, effort and money? What therapy interventions are better than others?" (Darley, 1972, p. 4-5).

In 1995 Enderby and Emerson recommended that in order to answer Darley's third question researchers would be faced with the challenge of "understanding, describing, and detailing the components of therapy in order to evaluate the most active and desirable features and to eliminate the aspects that are inert or possibly harmful" (Enderby & Emerson, 1995, p. 166). What follows will demonstrate that aphasia therapists are still trying to answer Darley's (1972) three questions nearly fifty years later (Baker, 2012; Webster et al., 2015). It will evaluate the evidence base for word finding therapy for people with aphasia and provide a context for the introduction and relevance of activation therapy.

Word finding therapy has formed the most substantial part of aphasia research to date and Wisenburn and Mahoney (2009) suggested that the amount of this research may even be too overwhelming to be able to synthesise and evaluate. Because of the countless number of studies devoted to evaluating the impact of aphasia therapy this review will only review studies that have spoken word finding for nouns as their primary focus for intervention and it will not include studies that do not address noun word finding as the primary focus. Despite their relevance to aphasia rehabilitation, studies that assess the impact of other types of aphasia intervention will not be included in the upcoming review of the literature that underpins noun word finding therapy for people with aphasia. For example studies that investigate the benefits of auditory processing therapy (Woolf et al., 2014), single word comprehension therapy (Fleming et al., 2021), verb accessing therapy (Boo & Rose, 2011; Conroy et al., 2009; Rose et al., 2013a), sentence processing therapy (Carragher et al., 2015), melodic intonation therapy using sentences (Conklyn et al., 2012; Sparks et al., 1974), multi-level therapy (Milman et al., 2014), the use of technology in aphasia therapy (Caute et al., 2018; Cistola et al., 2020; Palmer et al., 2014, 2019; Stark & Warburton, 2016), the impact of therapy on brain activity (Lyer et al., 2020; Johnson et al., 2020), visual art in therapy (Pachalska & Goral Polrola, 2020), cognitive flexibility therapy (Spitzer et al., 2020), identification of therapy behaviours that predict recovery (Brogan et al., 2020), and therapy methods that adapt the conversational environment to help PWA communicate (Fox et al., 2009).

Furthermore, the review will focus on spoken word finding therapy studies only and not those that provide therapy for written (Robson et al., 1998), gestural (Helm Estabrookes, 1992) or pictorial word finding difficulties (Hunt, 1999). It will also allocate more significance to the impact of studies in which therapy has been delivered by therapists and not those that have used indirect self-directed study to provide word finding therapy such as the studies conducted by Nickels (2002) and Pring et al. (1993). With these caveats, all therapy studies that have addressed noun word finding therapy for PWA were considered suitable for inclusion in this review. Papers were identified through electronic searches using different search engines such as Cumulative Index of Nursing and Allied Health Literature, Scopus, Academic Search Premier (EBSCO), Medline (PubMed), and Google Scholar. Classic literature searching (Bates, 1989) was supplemented by iterative berry picking (Bates, 1989) which Bates (1989) describes as continuous literature searching throughout the research process. Multiple searches for relevant literature included initial literature searches described above alongside footnote chasing, citation searching, journal runs, area scanning and author searching. Searching for relevant literature concluded with the submission of this thesis.

2.4 What we Know So Far

2.4.1 *The Impact of Aphasia Therapy is Not Time Limited*

Evidence suggests that PWA may benefit from intervention a long time after the period of spontaneous recovery has elapsed (Koyuncu et al., 2016; Pashek & Holland, 1999: Pulvermuller & Berthier, 2008). Poeck et al.'s (1989) study with 68 participants suggested that aphasia therapy was beneficial for PWA immediately after their stroke and for PWA whose aphasia had lasted for up to a year. Code et al.'s (2010) study into the effects of conventional therapy for 7 PWA suggested that even people with aphasia lasting on average 34 months post onset of aphasia can benefit from impairment based therapy. This research suggests that aphasia rehabilitation can affect problematic language skills a long time after the initial language loss has occurred.

2.4.2 *Intensity and Dosage of Aphasia Therapy*

Some of the aphasia therapy evidence base suggests that intensive delivery of therapy is more successful than less intensive delivery. Bhogal et al. (2003) compared 8.8 hours of therapy delivered in each of 11.2 weeks with 2 hours of therapy delivered in each of 22.9 weeks and found that the more intense therapy schedule was more effective than the less frequent. Research conducted by Breitenstein et al. (2017) suggested that as little as three weeks of intensive language therapy could enhance the verbal communication of participants and Kurland et al. (2010) suggested that a short two week period of constraint induced intensive language therapy improved word finding. This and other very persuasive literature has suggested that intensity matters (Brady et al., 2016; Breitenstein et al., 2017; Worrall & Foster, 2017). However, Baker (2012) proposed an alternative viewpoint and suggested that the relationship between the amount of therapy provided for a person with aphasia and its success is not clear cut. More therapy and more intensive therapy does not always result in better findings (Bakheit et al., 2007; Ramsberger & Marie, 2007; Raymer et al., 2006).

These seemingly contradictory assertions could be explained by the methodological choices that different researchers incorporated into their research designs. There seems to be a fuzzy boundary about what constitutes intensive intervention, for example Pulvermuller et al. (2001) defined low intensity therapy as 5 hours or less a week, whilst Bakheit (2007) and Denes et al. (1996) referred to 5 hours a week as high intensity therapy. Another confounding factor may be that studies which include participants with long term aphasia are evaluated alongside studies which include people in the acute phase of recovery. This means that spontaneous recovery rather than therapy may be the reason for reported gains in language function (Bakheit et al., 2007; Denes et al., 1996; FUATAC, VERSE 1, Smith iii, SP-I-RIT, as cited in Brady et al., 2016).

Other studies demonstrate other methodological impediments which may impact negatively on the generalisability of their findings. Some studies use outcome measurements which are indirectly related to the therapy provided (Bowen et al., 2012; Brady et al., 2016) and others conflate the impact of intensive therapy and more therapy (Bhogal et al., 2003), rather than separating the differential impact of intensity and overall amount of therapy that was provided (Thomas et al., 2020). Other research does not overcome the difficulties attending a course of intensive therapy (Gunning et al., 2017) which leads to a greater number of participant withdrawal than is desirable for conducting a valid and reliable research project (Brady et al., 2016; CASP, 2020). Furthermore, projects which have included children with speech language and communication difficulties (Baker, 2012; Schmidt et al. 2017) have found an inverse relationship between progress and intensity which suggests that aphasia therapy research community also needs to consider the possibility of this type of negative consequence of delivering more therapy more often.

The reason for the different results reported in the evidence base may also be explained by how learning happens for people with post stroke aphasia. Dignam et al. (2017) suggested that learning was behaviour change because of experience which could be implicit or explicit and affected by personal factors, cognitive factors, the learning experience and the learning schedule. Research teams that base their studies on cognitive neuropsychology theory construe learning as more effective if it occurs in a distributed way (Capeda et al., 2009). Conversely, therapy which depends on experience dependent neuroplasticity may construe learning as the result of the frequency repetition (Barthel et al., 2008; Bhogal et al., 2003; Breitenstein, 2017: Pulvermuller et al., 2001), but as much of neural network theory has derived from animal studies it may not be entirely relevant when considering the role of intensity and repetition in the remediation of language difficulties. When the two types of learning have been compared, massed practice and distributed, (Pierce et al., 2020; Thomas et al., 2020) there is not a clear indication that one type of input is more effective than the other and therefore, currently, either evidence base can be used to support the design and delivery of aphasia therapy studies.

Warren et al. (2007) provided a framework that may allow more specific reporting of therapy interventions which in turn may inform whether or not intensity of aphasia therapy affects outcome. Warren et al. (2007) suggested that the concepts dose form, dose, dose frequency and duration of therapy could be used to calibrate multifaceted and dynamic aphasia intervention. They defined dose form as the therapy task itself and dose as the number of these predetermined therapy acts provided in a timed session. Warren et al. (2007) proposed that the term dose frequency could describe the number sessions provided in any given time frame and duration of therapy would enable the reader to calculate the number of sessions provided in a single episode of care. Cherney (2012) augmented this advice and suggested that totalling the number of sessions that had been provided would also help to describe the nature of any therapeutic input.

Warren et al.'s (2007) intention for this framework was to enable cross trial comparisons of different therapy packages when applying a cumulative intervention intensity formula which they expressed as - dose x dose frequency x total intervention duration. What this formula does not quantify however are the other active ingredients of therapy such as the client's contribution to the process of intervention. It does not identify which parts of the therapeutic act are crucial for its success (Baker, 2012; Cherney, 2012; Dignam et al., 2016), and which aspects may be redundant. Integrated alongside more widely acknowledged quality benchmarks (Cochrane, Brady et al., 2016; CASP, 2020; TIDieR, Hoffmann et al., 2014; CONSORT, Moher et al., 2001; SCED, Tate et al., 2008), Warren et al.'s (2007, p. 72) formula may be a pragmatic way of adding detail to how aphasia therapists report their intervention and will allow more accurate comparisons between and across different intervention studies (Baker, 2012; Darley, 1972; Enderby & Emerson, 1995).

2.4.3 *The National Health Service and Aphasia Therapy*

Unfortunately, despite this evidence for the impact of aphasia therapy, PWA are unlikely to be able to benefit from therapeutic input (Code & Heron, 2003; Katz et al., 2000) because of the way in which aphasia therapy in Britain is currently delivered. Early and influential work on the efficacy of post stroke care conducted by Langhorne and Holmqvist (2007) provided a model of early supported discharge from hospital that could be concluded in as little as four weeks and three visits from members of the early supported discharge team and this provision did not necessarily have to include direct language therapy or therapy delivered by a Speech and Language Therapist. In Britain, the Early Supported Discharge teams typically provide six weeks of multidisciplinary support to those who are discharged home from hospital after a stroke (Care Quality Commission, 2011) and this level of input mirrors, perhaps coincidentally, the model of post stroke health care operating in the United States in 2003 where the basic insurance company package for post stroke Speech and Language Therapy (Clinton, 2003) was six weeks. This model of healthcare provision is not designed to provide long term intensive or non-intensive aphasia therapy which the evidence base suggests is an effective use of therapy resources.

The Care Quality Commission (2011) suggested that after discharge from the early supported discharge team PWA may have to wait up to 50 days for their first Speech and Language Therapy appointment. Palmer, Witts and Chater (2018) reported more recently, that these problems highlighted in 2011 persist and are ongoing. People wishing to access language therapy in the community typically may have to wait more than three months to receive on average 6.3 hours of therapy over a twelve week period of time. These papers seem to suggest that even though the profession has evidence to support the usefulness of long term intensive and less intensive aphasia therapy, current models of service delivery in England do not support its implementation and the evidence to support the usefulness of therapy that can be delivered within the current organisational parameters is limited.

What is clear is that current therapy provision is very limited. Furthermore, much research provides intervention in a way that could not be replicated in everyday clinical practice (Thomas et al., 2020). In 1998, Bixley provided activation therapy to four participants with aphasia focussing on 50 items in one to one and a half hour sessions, twice a week for 10 weeks, a total of 20 sessions. At the time, this provision was what would have been provided if participants had been attending outpatient therapy within their local health authority and what professional standards would have considered suitable (Van Der Gaag, 1996). This is evidently a different cumulative intervention intensity formula (Warren et al., 2007) than could be provided in today's Speech and Language Therapy Departments (Palmer, Witts & Chater, 2018). To ensure a present day aphasia therapy study could provide an evidence base that could translate directly into the local Speech and Language Therapy context (Baker, 2012; CASP, 2018), the amount of activation therapy would need to mirror what might be available within the current limited context.

2.4.4 *The Impact of Aphasia Therapy can Generalise*

One of the ways in which the success of word finding therapy has been judged is whether or not its impact generalises beyond the stimuli used in therapy and to other language contexts. Beeson and Robey (2006) suggested that generalisation of the impact of word finding therapy may be identifiable if overall word finding skills improved. Webster et al. (2015) referred to this type of impact as within level generalisation. Beeson and Robey (2006) also suggested that the impact of word finding therapy may be identifiable within connected speech. Webster et al. (2015) referred to this type of change as across level generalisation and this type of impact is considered more difficult to achieve (Conroy et al., 2009i; Kelly et al., 2012; Mayer & Murray, 2003), and more difficult to locate (Beeke et al., 2003; Conroy et al., 2009).

Across level generalisation, which could also be conceptualised as the impact of therapy on word finding therapy on functional communication, is considered one of the most important aims of impairment based therapy (Brady et al., 2020; Carragher et al., 2012; Edwards, 1987; Linnik, 2016; Oelschlaeger, 1999; Schuell et al., 1964; Smith, 1985). Within level generalisation, which is considered a positive outcome of word finding therapy, is a relatively elusive research finding (Boyle & Coelho 1995; Boyle, 2004; Conroy et al., 2009; Franklin et al., 2002; Hillis 1989; Kiran & Thompson 2003). Evidence of across level generalisation is even harder to locate (Webster et al., 2015) and seems, with noteworthy exceptions (Spencer et al., 2000), to be associated with the investigation of the impact of semantic feature analysis (Boyle, 2004; Coelho et al., 2000). Pragmatically, Behrmann and Byng (1992) conceded that specific or widespread generalisation would be considered a good outcome for word finding therapy.

Early research into the remediation of word finding difficulties suggested that word finding could be improved if PWA could use access to word representations in one modality to support word access in another modality. Weigl (1961) demonstrated that auditory comprehension of words could help people to write words. Retrospectively, this early account of within word generalisation between modalities sits well with the presumption that listening, reading or seeing a picture of a word recruits its entire representation (Dell & O'Seaghdha, 1991; Howard, 2000; Levelt, 2001). It may be the basis for Howard's (2000, p.81) and Nickels' (2002) claim that the best kind of treatment for word finding problems is word finding practice. Studies which have demonstrated the impact of comprehension therapy on spoken word finding skills would also support the notion that within word level generalisation is observable in studies where word finding is supported through deblocking in an alternative and accessible modality (Bixley, 1998; Hillis, 1998; Jones, 1989; Morris & Franklin, 2012).

Webster et al. (2015) suggested that within level noun word finding generalisation has been studied systematically and suggested that these studies typically used valid and reliable ways to measure targeted and generalised improvements. The authors impressed the need for noun word finding therapy researchers to use theory to predict the within level change that might occur because of the intervention they provided, a theory for therapy (Baddeley, 1993; Caramazza and Hillis, 1993). Exemplars could include Howard et al., (2006) who used non-decompositional linguistic theory (Levelt, 2001; Levelt et al., 1991) to predict therapy specific word finding improvements for the nine participants with less semantic impairment in their research study comparing the impact of spoken word to picture matching and immediate and delayed word finding intervention. The improvement was attributed to improved lemma to word form mapping rather than improved semantic accessing (Howard, 2000; Levelt, 2001; Levelt et al., 1991).

Franklin et al., (2002) also cited non-decompositional linguistic theory (Levelt, 2001; Levelt et al., 1991) to predict that the impact of sound recognition and sound production therapy would generalise to words not targeted in therapy because improved sound production would be evident in the articulation of all words that recruited that sound. Other authors have used decompositional lexical theories (Dell & O'Seaghdha, 1991; Schwartz et al., 2006) to predict that successful semantic feature analysis therapy will generalise to other words which share or are connected to the features targeted in therapy (Boyle, 2004; Coelho et al., 2000; Delong et al., 2015; Haentjens & Auclair-Ouellet, 2020; Wambaugh et al., 2014).

One of the difficulties of Webster et al.'s second imperative is that looking for theoretically congruent predictions may narrow the focus of investigation and lead to relevant findings being left unnoticed (Beeke et al., 2011). It may also dictate the scope of therapeutic investigation. If one accepts the non-decompositional view of word representation it may seem logical to treat a strategy to help word finding difficulties. This is because if the impact of therapy does not generalise between related items (Thompson, 1989). This view of therapy would also suggest that therapists should prioritise the treatment of personally relevant vocabulary (Greenwood et al. 2010; Renvall et al., 2013; Palmer et al., 2019).

Achieving the benchmarks of theoretically congruent predictions for change and valid measurements of the impact of therapy is harder for across level generalisation studies. This is because there is very little evidence base on which to base predictions (Dipper et al., 2020; Webster et al., 2015) and choose how to measure outcomes (Dipper et al., 2020). The 500 discourse measures identified by Bryant et al. (2016), Dipper et al. (2020), and Pritchard et al. (2017) give weight to the premise that at present research into cross level generalisation is still exploratory. What seems certain is that different elicitation contexts produce different types of language (Armstrong, 2000; Cruice et al., 2014; Shadden et al., 1991). Therefore, indicators that identify change for one task may not be relevant for another task. For example, looking at the number of correct information units (Nicholas and Brookshire, 1993) would have very little relevance for measuring the impact of word finding therapy on co-constructed conversations (Goodwin, 1995; Green, 1984; Kagan, 1998; McVicker et al., 2009). Alternatively, they would be pertinent when measuring the change in picture description abilities pre and post therapy (Boucher et al., 2020; Pashek & Tompkins, 2002).

Webster et al. (2015, p. 1256) stated that they thought prediction of across level change was a crucial aspect of evaluating the communicative value of therapy but also suggested that currently the aphasia research community need a greater understanding of the relationship between tasks, linguistic levels and linguistic change (2015, p. 1259). Dipper et al. (2020) suggested that to overcome this difficulty researchers could plan outcome measurement around the expected change. A rare example of this prospective outcome planning for noun word finding therapy is demonstrated by Rose and Douglas (2008). In their study they assessed the use of the words targeted in therapy derived from three personally relevant categories (animals, musical instruments and tools) in three personally relevant procedural discourse contexts (going to the zoo, going to see an orchestra, and building a child’s playhouse). In another rare example, Greenwood et al., (2010) provided eight weeks of noun word finding therapy for their client TE followed by eight weeks of therapy directed at word finding and word finding in interactions such as naming to definition, making lists and free conversation about chosen topics such as gardening. Unfortunately, they reported that the evidence for the impact of noun word finding therapy generalising to connected speech was not convincing (Greenwood et al., 2010 p. 1008). These limited examples from single case studies suggests that the evidence base to inform measuring the impact of word finding therapy on conversation is limited.

In summary, there is a body of aphasia research that suggests that the primary aim of aphasia therapy is to improve everyday communication. Therefore, the aim of word finding therapy is that its impact should transfer from therapy into connected speech. It has been argued that our understanding and ability to demonstrate within level generalisation is more advanced than our understanding and demonstration of across level generalisation. There is some theoretical and evidence based underpinning for the premise that noun word finding therapy may have an impact on functional communication (Best et al., 2011; Davis & Harrington, 2006; Greenwood et al., 2010), but currently the evidence base is limited and needs further exploration.

2.4.5 ***Conventional Aphasia Therapy***

The evidence reviewed so far suggests that aphasia therapy can help the word finding skills of PWA with aphasia and its impact can generalise to words not used in therapy and across level to connected speech. What is not clear is what parts of aphasia therapy help these improvements to happen and whether some parts of aphasia intervention actually inhibit its impact. This difficulty will be addressed in the first part of this chapter which reviews the valuable contribution of conventional therapy studies to the aphasia therapy field. Aphasia therapy researchers have urged (Baddeley, 1993, Byng and Black, 1995; Caramazza and Hillis, 2007; Webster et al., 2015) and demonstrated how those who study aphasia need to provide a theory for therapy (Bose et al., 2019: Sze et al., 2020; Howard and Gatehouse, 2006). To date, the most substantial share of research into aphasia therapy has focused on the different contributions of semantic and phonological approaches to aphasia intervention (Wisenburn & Mahoney, 2009). A critical evaluation of these two prominent approaches to aphasia therapy will be evaluated in the subsequent subsections of this chapter and the chapter will conclude with a statement of the aims and objectives for this project which will be presented alongside critical summaries of the literature from which they were derived.

Conventional aphasia therapy is the common term applied to treatment that is general and non-specific. It is the term that has been used to describe the therapy that has been provided in a number of treatment studies (Bowen et al., 2012; Pulvermuller, 2001; Seron et al., 1979). Some studies have suggested that conventional therapy is not beneficial and its impact cannot be separated from social support offered by untrained visitors. For example, the Bowen et al. (2012) study provided conventional therapy which they called “enhanced, agreed best practice, communication therapy specific to aphasia or dysarthria” (Bowen et al., 2012 p. 315, 1).Their intervention included assessment, direct therapy providing information, providing augmentative and alternative communication devices, carer and multidisciplinary team contact, and at the end of the trial the authors concluded that this type of intervention during the first four months of post stroke recovery was no more effective than conversations with an untrained social contact.

Some research has suggested that PWA find conventional aphasia therapy is beneficial. Poeck et al.’s (1989) study with 68 participants suggested that their aphasia therapy programme was relevant for PWA. Their programme provided participants with treatment that focussed on their linguistic difficulties and provided semantic field, phonemic word contrast, sentence processing, questioning, expressive language and comprehension therapy. More recently Breitenstein et al’s (2017) randomised controlled trial study found that intensive speech therapy was successful but it is unclear what kind of therapy contributed to the success of research as the authors stated that their intervention “was based on best practice guidelines … combining linguistic and communicative-pragmatic approaches individualised to the basline profile of each patient” (Breitenstein et al., (2017 p.1531). This research provides support for the premise that impairment based therapy can benefit PWA but it is apparent that neither of these studies address Darley (1972, p. 4-5) and Enderby and Emerson’s (1995, p. 166) directives to understand what interventions work and to try and identify the reason for their impact (Baker, 2012; Warren et al., 2007) or indeed, their lack of impact. The only conclusion that can be reached from these types of general conventional aphasia therapy research studies is that some studies find that conventional therapy is useful and some studies do not.

2.4.6 *Phonological Therapy*

Traditionally word finding therapy has been divided into two types, meaning based semantic therapy (Barry & McHattie, 1991; Law et al., 2006; Nettleton & Lesser, 1991; Tsuda et al., 2013) and sound based phonological therapy (Bose et al., 2019; Martin and Laine, 2000; Miceli et al., 1996; Robson et al, 1998; Tsuda et al., 2013). Hashimoto (2012) used a combination of meaning and sound based feature therapy and she found that this type of therapy programme was successful for both of her clients. Doesborgh et al. (2004) conducted a study with 58 participants who received 40-60 hours of meaning mixed with sound based therapy in a study which used a randomised control trial research design. They found that combined meaning and sound therapy had a beneficial impact on the participants in their trial. These studies provide support for aphasia intervention but it is not clear which part or parts of the intervention were responsible for the change in language function. Factors which may be relevant to identifying what parts of aphasia therapy result in meaningful change will be the focus for the next part of this review of the aphasia evidence base.

Phonological therapy focuses on helping PWA to access speech sounds more effectively. Methods such as repetition, reading words, writing words, providing initial sounds, and syllable cues have all been referred to as phonological therapy methods (Wisenburn & Mahoney, 2009). Saito and Takeda (2001) found that first sound phonological cues helped the 11 PWA who participated in their trial to find words immediately. Robson et al. (1998) encouraged their participant to think about the first sound of a word and how many syllables it contained and Martin and Laine (2000) described another phonological method that encouraged word finding practice using groups of words that started with the same sound. Bose (2013) and Bose et al. (2019) used phonological component analysis to help PWA to think about a word’s sound structure to enhance word finding. They suggested that thinking about words that rhymed with the target word, words that had the same first and final sound, thinking about the number of syllables the word had and finally practising saying the word aloud was beneficial.

From a modular processing model perspective (Levelt, 2001; Levelt et al., 1991), activation between levels is time limited and item specific and phonological therapy activates phonological word level and sound level representations. Saito and Takeda (2001) suggested that phonological processing difficulties arise after the lemma has been accessed but before the phonological form of the word has been chosen. Levelt et al. (1999) conceptualised the lemma as the representation within the brain that stored not only information about a word but also its associated properties such as information about its syntax and gender. In Levelt et al.'s (1991, 1999) serial model, a phonological cue would help a PWA to find words because it would increase the activation where it is required, at the level of the word form. Providing extra stimulation to meaning processing would only provide more impetus within intact meaning processing representations but have no impact on phonological word finding difficulties which arose after meaning has been accessed.

From an interactive processing model perspective (Dell & O'Seaghdha, 1991; Schwartz et al. 2006) phonological therapy would help anyone with a word finding difficulty whatever processing difficulties they had. This is because in an interactive model of single word processing, activation is continuous and multi directional. Activation occurs within and between meaning level representations, word level representations and sound level processing. Activation feeds forward and feeds backwards within and between levels continuously. Consequently, stimulating word form and sound level representations will enhance activation throughout the whole representation.

Current word finding research has been informed by seminal papers by Patterson et al. (1983) and Howard et al. (1985c) that suggested that phonological therapy helped PWA find words and its impact is long lasting, for example the impact of Howard et al.'s (1985c) repetition and rhyme cue phonological therapy was still apparent thirty minutes after therapy had ceased (Howard et al., 1985b). However, research by Martin and Laine (2000) also found that massed repetition of the target alongside repetition of phonologically related words had a short term impact on word finding but its effect was not as great or significant one week after the therapy provision had ended. Several studies corroborate this viewpoint and indicate that phonological therapy has a short term impact on word finding that decreases when therapy is withdrawn (Bose et al., 2013, 2019; Fisher et al. 2009; Martin and Laine, 2000; Nickels, 2002). These studies seem to suggest that support for the longevity of phonological therapy is mixed.

Miceli et al. (1996) suggested that the weakness of phonological therapy was that it did not generalise. Their research with two PWA suggested that fist sound cues would only work for the specific words targeted in therapy, but encouragingly for one of their participants this effect was present 17 months after the end of the therapy trial. Howard et al., (2006) also presented the argument to suggest that phonological therapy works because its impact is item specific and enhances mapping between the lemma and the word form. Franklin et al., (2002) proposed that there was one way that phonological therapy may generalise and this was if it addressed phonological processing that was common to all word finding, and demonstrated this with the success of sound recognition and sound production therapy for a single client with phonological encoding difficulties. This limited evidence for generalisation, in conjunction with the evidence for the longevity of phonologicla therapy suggests that any research into this field is still exploratory.

2.4.7 Semantic Therapy

Semantic therapy methods are those that use meaning to help PWA to find words more easily (Wisenburn & Mahoney, 2009). Examples of semantic therapy methods are associate cues (Bose & Buchanan, 2007; Chin Li & Williams, 1990; Saito & Takeda, 2001), spoken and written word to picture matching with associated distractors (Wilshire & McCarthy, 2002), distant associated cue (Saito & Takeda, 2001), categorisation (Davis & Harrington, 2006), semantic decisions (Barry & McHattie, 1991; Davis & Harrington, 2006; Howard et al., 1985c; Morris & Franklin, 2012), semantic feature analysis (Boyle & Coelho, 1995) and circumlocution induced word finding (Francis et al., 2002). There is a consensus that semantic therapies are thought to be more effective than phonological therapy because their effects are longer lasting (Barry & McHattie, 1991; Howard et al. 1985b; Marshall et al., 1990), and they generalise more successfully (Barry & McHattie, 1991; Davis & Harrington, 2006; Howard et al., 1985b; Lowell et al., 1995; Marshall et al., 1990).

Rationales for semantic therapy have been based on theories of semantic representation in which meaning has been conceptualised. These conceptualisations are not always complementary, for example, Katz and Fodor (1973) suggested that meaning was stored as a part of a hierarchical tree in much the same way as grammarians envisaged that syntax was organised, whereas Rips, Shoben and Smith (1973) took a different view and suggested that meaning representation was defined at the point where many different continuums connected in a multidimensional network of meaning representation. Collins and Loftus (1975) agreed with the premise that some words are more closely associated than others when they proposed their spreading activation network theory of semantic organisation in which associated words are stored closely together and less related items are stored further apart. Finally, Allport's (1985) model of a distributed memory system highlighted the way information entered and exited the brain. It emphasised how knowledge is encoded through different sensory modalities and how different modalities can be recruited to express meaning.

Prominent single word processing theorists Dell and O'Seaghdha (1991) and Levelt et al. (1991) also disagree as to how word meanings are represented in the brain. Dell and O'Seaghdha (1991) suggest that meaning is stored as a memory pattern of connected features, in much the same way that Rips Shoben and Smith (1973) described the place where the convergence of meaning on their multidimensional continuum. Conversely, Levelt et al. (1991) and Roelofs (1992) suggested that meaning could not be decomposed into its constituent parts but was defined by a single chunked complex memory in much the same way that Collins and Loftus (1975) referred to meaning as nodes in their meaning network. Furthermore, this node acted as a gateway to this stored information and accessing the chunked memory did not mean that the individual parts of the meaning memory were also accessed.

Meaning therapy is thought to work because it enhances access to meaning (Attard et al., 2013; Bose & Buchanan, 2007; Martin & Laine, 2000; Saito & Takeda, 2001). It is successful because it strengthens patterns of activation and it also helps by enhancing discrimination between similar associated concepts (Boyle, 2004; Boyle and Coelho, 1995; Collins and Loftus, 1975; Mirman & Britt, 2014: Pulvermuller & Berthier, 2008; Wambaugh et al., 2013). Saito and Takeda (2001) proposed that this explanation is relevant for either modular (Levelt et al., 1991) or interactive models of single word processing (Dell & O'Seaghdha, 1991) as using both of these conceptualisations meaning therapy works because it enhances access to concepts and enhances the process of discrimination between concepts that have similar meanings.

There is some disagreement about whether the impact of meaning therapy can be enhanced by encouraging the PWA to reflect and engage with the words that they are struggling to find. One viewpoint is that accessing a concept recruits the whole concept and however much the PWA thinks about a word and its meaning is irrelevant (Howard et al., 2006; Roelofs, 1992). The other perspective suggests that engaging with a word's underlying meaning will enhance word finding (Jones, 1989; Hillis, 1989; Kiran & Thompson 2003; Scott, 1987). Currently both viewpoints are equally persuasive and have been used to rationalise the relevance of meaning therapy for PWA.

The first proposition that the depth of meaning processing is irrelevant, is very much akin to Levelt et al.'s (1991) view of meaning being stored holistically as a chunked non decomposed memory. Accessing meaning will access the node itself but not the meaning which it represents. Barry and McHattie's (1991) study with 12 PWA suggested that general meaning cues, intermediate meaning cues and specific word meaning cues were equally effective and this research could be used to argue that, what was important for word finding therapy was that the concept was accessed and the amount of meaning that was accessed was irrelevant. This argument is supported by research such as that conducted by Davis and Pring (1991) who found therapy with seven PWA using closely associated distractors had the same effect as therapy with unrelated distractors and Howard et al.'s (2006) experiments with 17 PWA which suggested that the word finding skills of people with more (8) or less (7) meaning accessing difficulties were not affected by the degree of semantic relatedness of the distractors used in a series of spoken word to picture matching tasks. This research too could be used to argue that any degree of semantic access and differentiation was as effective as any other.

In contrast, Byng and Jones (1993) suggested that engaging and reflecting on a concept was likely to have a beneficial impact on long term word finding and this viewpoint is closely aligned to Dell and O'Seaghdha's (1991) view of a distributed memory system in which meaning is stored as a pattern of associated features. Accessing meaning results in a pattern of activity that recruits all relevant features and thereby strengthening the reciprocal pattern of meaning activity. Spreading activation may also strengthen the reciprocal pattern of meaning activity words which are closely associated (Collins & Loftus, 1975). More recently, McRae et al.'s (2005) research into semantic feature norms elicited from 725 people without aphasia suggested that all concepts are linked on a continuum of similarity and difference and therefore distinguishing between closely related concepts will be harder than differentiating between dissimilar concepts (Davey et al. 2016). The results of Rose and Douglas' (2008) study into the impact of word finding suggests understanding could also be used to support this viewpoint. Their study suggested that thinking about the meaning of a word was more important than whether the word was spoken or gestured.

Kiran and Thompson's (2003) research also supports this argument. The authors found a greater impact in divergent therapy exercises which encouraged their four participants to learn about atypical category members rather than typical category members. In a further study in 2008, Kiran investigated the impact of therapy on generalisation of within level word finding skills within categories and they found that therapy had a larger impact if it focussed on categories and words within categories that were less common and less representative of that set, suggesting that tasks that required more semantic processing resulted in better word finding skills. These three studies seem to suggest that increasing the difficulty involved in accessing words results in better word finding skills and this may be attributable to the depth of meaning processing and the degree of meaning reflection that is involved in the therapy task. One of the most prominent techniques that has used to enhance the depth of semantic processing to aid subsequent word finding is semantic feature analysis and this therapy technique will be the focus of the next part of this review.

2.4.8 *Semantic Feature Analysis*

Feature analysis (Ylvisaker & Szekeres, 1985), or, as it is more frequently called, semantic feature analysis (Boyle & Coelho, 1995) is a therapy technique that draws upon the rationale that thinking about a word's meaning will help word finding. Ylvisaker and Szekeres (1985) suggested that if people with word finding difficulties were encouraged to practise word finding by thinking about the properties of words, the individual's ability to find the target word would improve. Ylvisaker and Szekeres (1985) suggested that people with word finding difficulties resulting from any aetiology should be encouraged to think about a word's associations, and its perceptual, semantic, and experiential features. Haarbauer et al. (1985) refined this suggestion and proposed that people should be prompted to think of a target word and at least six words that were connected to that target word in six specific ways: people should think of an association, the group membership, an associated action, a property of the item, the item location, and finally what the item was used for. If they had difficulty finding the word for themselves the therapist could prompt the PWA into finding the association by using different types of cues until the PWA found all six associations and were able to say the target word out loud. They suggested that the client should continue to practise feature analysis until they could complete the process almost independently.

In (1994) Massaro and Tompkins demarcated the feature analysis method in their successful therapy trial with two people with acquired brain injury and Boyle and Coelho (1995) were the first to report the implementation of feature analysis with a single participant with aphasia. They were the first researchers to use the term semantic feature analysis in the aphasia therapy literature. A visual representation of a typical feature organiser is presented in Figure 2:1 Visual Representation of a Semantic Feature Analysis Organiser. Since the 1950s, a range of studies have shown that semantic feature analysis encourages PWA to practise word finding beyond the relatively simple act of labelling single concepts (Boyle, 2004; Rider et al., 2008; Delong et al. 2015; Evans et al., 2020: Gravier et al., 2020).

Haarbauer et al. (1985) and Szekeres et al. (1987) suggested that semantic feature analysis helps to organise the part of the brain responsible for word finding by providing word finding practice and by providing a framework for word finding therapy. Other authors such as Falconer and Antonucci (2012) and Massaro & Tompkins (1994) suggest that semantic feature analysis may also be successful because it allows people with word finding difficulties to use feature generation as a word finding strategy when they encounter word finding difficulties.

Unfortunately, having aphasia means that an individual may not be able to use this strategy because in addition to having difficulty finding the target word they may also encounter difficulty accessing the associated words required to complete the semantic feature analysis process. Evans et al. (2020), replicated an earlier study conducted by Gravier et al. (2018) and agreed with Gravier et al.'s finding that suggested that a participant's ability to find features at the beginning of therapy was a strong indicator of the likelihood of success in therapy. This study suggests that semantic feature analysis may have the most relevance to PWA who can already access words.

Figure 2.1

Visual Representation of a Semantic Feature Analysis Organiser

Concept:		
1. Association	makes me think of	(client supplies word)
2. Group	is a	(client supplies word)
3. Action	does what	(client supplies word)
4. Properties	has is	(client supplies word)
5. Location	is found	(client supplies word)
6. Use	is used for	(client supplies word)

Another impediment to using semantic feature generation as a word finding strategy is that cognitive difficulties may prevent a PWA implementing the strategy unaided (Massaro and Tompkins, 1994). Purdy and Koch (2006) highlighted the role of cognitive flexibility in the use of compensatory strategies such as semantic feature analysis and Falconer and Antonucci (2012) suggested that cognitive difficulties had adversely affected one of their four participants' ability to complete semantic feature analysis related homework tasks. Given these practical limitations, theoretical support for the implementation of the semantic feature generation as a word finding strategy is less persuasive than the neural and conceptual theory that supports the implementation of the semantic therapy framework for word finding practice and its ensuing benefits (Cave, 1997; Creet et al., 2019; Howard et al., 1985b; Nickels, 2002; Pulvermuller & Berthier, 2008).

Some word finding therapy research has suggested that accessing a word's associated features may actually inhibit the ability to access that word for some time after it had been articulated. Martin et al. (2004), Podraza and Darley (1977) Wilshire and McCarthy (2002) have all reported an inhibitory effect on word finding skills when associated distractors were used during therapy. Forde and Humphreys (1997, 2007) suggested that once a cell has been activated there is a period of time when the cell reorganises its chemical and electrical activation to it previous resting state. This period of time is called a refractory phase and the cell cannot be activated until the refractory phase is completed and the cell regains equilibrium. Furthermore, the dampening effect of restoring electrical readiness is not modality specific.

Oppenheim et al. (2010) offered a different explanation for the observed inhibitory impact of focussing on a word's associations. They suggested that the impact of thinking about a concept's associations was not inhibition of activation but the impact of error based learning. This is because both target words and semantic associates share features and become more accessible each time they are activated (Gordon & Dell, 2010). This makes semantic associates viable and sometimes successful alternatives to the target word, the next time it is stimulated for spoken word finding.

Despite this evidence suggesting that using semantic features may have a negative impact on word finding, a growing body of research suggests that semantic feature analysis helps word finding. Initially expert opinion (Haarbauer Krupa et al., 1985; Szekeres et al., 1987) and more recently systematic reviews (Efstratiadou et al., 2018; Maddy et al., 2014) have concluded that semantic feature analysis is beneficial. There is also evidence to suggest that the impact of semantic feature analysis generalises to other words not targeted in therapy (Boyle, 2004; Coelho et al., 2000; Delong et al., 2015; Haentjens & Auclair-Ouellet, 2010: Wambaugh et al., 2014). However, some studies such as Rider et al. (2008) have been unable to find any evidence of generalisation at all but, as Boyle (2010) and Efstratiadou et al. (2018) pointed out, the difficulty with assessing the evidence base for semantic feature analysis is because researchers have used semantic feature analysis in different ways. Some therapy studies taught strategy implementation (Wambaugh et al., 2013), others asked PWA to write down features rather than say the words aloud (Kladouchou et al., 2017), some studies changed the semantic feature analysis organiser (see Figure 2.1 Visual Representation of a Semantic Feature Analysis Organiser), and lastly Falconer and Antonucci (2012) implemented semantic feature analysis within groups rather than individually, and concluded that the technique helped the communicative effectiveness of the four PWA in their therapy trial. These differences in study design, implementation, and varying degrees of underlying processing requirements mean that they cannot be evaluated as replication studies providing more concrete evidence for the semantic feature analysis technique itself. Rather they provide general support for therapy that focusses on accessing meaning and practising word finding.

2.4.9 *Model Appropriate Therapy*

Studies which have compared semantic and phonological aphasia therapy have found varying and inconsistent results. Hashimoto (2012) found that the two participants in her therapy trial both benefitted from semantic and phonological feature therapy and in two 32-hour therapy trials, Attard et al. (2013), Rose et al. (2013a) compared the impacts of a phonological therapy with a meaning based therapy and concluded that both approaches were equally successful. Kendall et al. (2019)

also found that both types of therapy were successful in their randomised controlled trial that included 58 PWA. Other studies have found that semantic therapy has more of an impact than phonological therapy (Howard et al. 1985c; Wambaugh 2003; Wilssens et al., 2015), whereas a study Van Hees et al. (2013) identified that semantic therapy was only successful for 4/8 participants and phonological therapy had been successful for 7/8 participants. Furthermore, a recent randomised controlled trial conducted by Silkes et al (2020) with 57 people suggested that the impact of phonomotor therapy, but not semantic feature analysis, was measurable three months after the therapy trial had stopped.

There has been a suggestion that semantic and phonological therapy might only work if it addresses the underlying processing impairment. People with semantic processing impairments will respond to semantic therapy (Hillis & Caramazza 1994; Howard et al., 1985b, 1985c) and people with phonological processing impairments will respond to phonological therapy (Drew & Thompson, 1999). The evidence base does not support this proposition entirely. Van Hees et al.'s (2013) study with 8 PWA found that that providing semantic therapy for participants with semantic processing impairments was not successful but providing phonological therapy was successful for all participants irrespective of whether their aphasia resulted from semantic or phonological processing problems. In Annoni et al.'s (1998) study, two participants with long term aphasia and different degrees of semantic processing impairment responded well to the same semantic therapy whereas another participant with phonological processing difficulties did not respond to either semantic or phonological therapy. Some researchers have argued that it is not always necessary to know why a person with aphasia encounters word finding difficulties particularly if therapy is successful, and there is a body of evidence that seems to suggest that both types of therapy may be relevant for people whose aphasia results from different levels of processing impairment (Annoni et al., 1998; Doesborgh et al., 2004; Lorenz and Ziegler, 2009; Pring et al., 1993; Wambaugh et al., 2003).

Hillis (1989), however, suggested that a careful examination of how aphasia affects the components of an individual's comprehension and expression allows therapists to select the right kind of intervention and Bastiaanse et al. (1996) and Webster et al. (2015) also proposed that language processing therapy should only be provided when a therapist had an explanation of why a therapy method might benefit their client. Hillis's (1989) kind of psycholinguistic assessment can and has been used to identify precise reasons for specific aphasia impairments by finding out if there is a processing problem affecting a specific level of language processing or a disruption to the routes between modules (Bose & Buchannan, 2007; Conley & Coelho, 2003; Drew & Thompson, 1999; Hickin et al., 2002; Hillis, 1989; Kiran et al., 2008; Tsuda et al., 2013; Nettleton & Lesser, 1991; Whitworth et al., 2005). This approach has been referred to as model appropriate therapy.

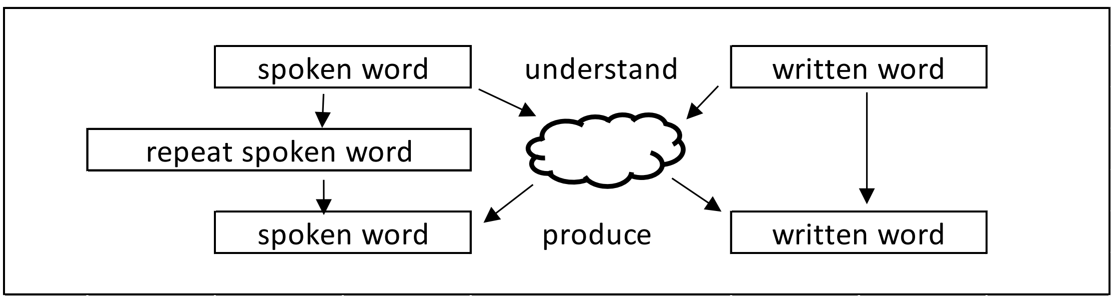
Word processing models explain producing single words using different vocabulary and different degrees of details. A very simplified model of single word processing is presented in Figure 2.2. Visual Representation of a Simplified Model of Single Word Processing. Some authors ascribe the theoretical underpinnings for their research into spoken word finding difficulties to one of the three primary processes involved in speech output. Using the vocabulary introduced in Patterson and Shewell's (1987) model of single word processing, these levels can be referred to as cognitive processing, phonological output lexicon processing and response buffer processing. In this model, which was used as the basis for Whitworth et al.'s (2005) model, semantic knowledge is stored within the cognitive system and semantic processing needs to be recruited for spoken word finding. Semantic representations are connected to word level representations and word level processing is referred to as phonological output processing. This word level knowledge is in turn connected to sound level representations and Patterson and Shewell (1987) refer to this level of representation as response buffer processing. After response buffer processing has occurred, muscles are recruited to transfer mental level representation into the body level movement required for speech.

Howard and Gatehouse (2006) and Levelt et al. (1999) describe two extra levels of processing that operate between conceptual representation and word level representation. One is lexical semantic processing which acknowledges that meaning cannot be based purely on sensory information such as that which is used to recognise and interpret objects. The second is the lemma level processing which Levelt (1991), has suggested stores the syntactical information about a word. This type of modular processing model relies on the premise that activation between levels is time limited and item specific (Levelt, 2001; Levelt et al., 1991) and this means that once an item has been selected, activation feeds forwards to the next level of activation and then that level in turn feeds forward to subsequent levels. Although there is spreading activation and competition within each level only one representation’s activation can cross the divide between each level (Levelt, 2001; Levelt et al., 1991).

However, there is an alternative view and some authors suggest that spreading activation occurs between and within semantic, lexical and phonological processing levels (Dell and O’Seaghdha, 1991; Schwartz et al., 2006). In these interactive models, activation is continuous, bidirectional and occurs within and between meaning, word and sound representation levels. Lambon Ralph et al. (2000, 2002) even challenge the need for word level representations and suggest that semantic and phonological processing could operate without an intervening stage of word level representation.

Figure 2.2

Visual Representation of a Simplified Model of Single Word Processing



PWA encounter difficulties using single word processing in the same easy fluent way that they could before the onset of their aphasia and using the modular processing approach, word finding difficulties may occur because there are problems processing information within and between these modules. Word finding problems occur because difficulties accessing and processing semantic information (Butterworth et al., 1984; Marshall et al., 1990: Van Hees et al., 2013). Word finding difficulties may also happen because there is incomplete drive and access from semantics to phonology and this lack of impetus might result in degraded phonological processing resulting in word finding difficulties (Gainotti, 1987; Morton, 1969). Phonological output processing problems may also result in phonological word finding problems (Van Hees et al., 2013) and a difficulty at this level may be apparent if word finding difficulties show a frequency or category effect (Francis et al., 2002). Response buffer processing problems would be apparent in word finding that resembled the sound structure of the target word very closely (Fisher et al., 2009; Gainotti, 1987) but was inexact. They would also be demonstrated by PWA finding longer words harder to access than shorter words (Best, 1995).

There are inherent difficulties diagnosing the level of language breakdown from language behaviour alone. The first of these is that traditional comprehension assessments may not be sensitive enough to identify a problem of meaning access that supports word understanding but does not support word selection for output (Lambon Ralph et al., 2000). There is also the difficulty that not all authors agree about which language behaviours are representative of specific levels of breakdown. When comparing Lesser and Milroy's (1993), Hillis' (1989) and Whitworth et al.'s (2005) word finding difficulty behaviour indicators, these three authors only agree on one behavioural indicator and this is that response buffer processing problems are indicated when PWA find longer words harder to access than shorter words. In addition to these well respected authors attributing the same type of word finding difficulty to different levels of single word processing difficulty they also cite phonological errors as indicators of difficulty within every level of single word output processing. This means that it would be difficult to use the presence of phonological word finding difficulties as a reliable indicator of difficulty within a specific part of the speech output process.

Interactive models of single word processing also provide support for the difficulty in using speech output to differentially diagnose between different levels of processing difficulties. Counterintuitively, Caramazza and Hillis (1990) argued that semantic paraphasias could result from problems outside the semantic system. The authors presented evidence from two single case studies. In these studies, the two participants with relatively intact semantic and written output skills both produced semantic word finding difficulties in spoken output assessments. Intact semantic processing skills suggested that a difficulty with semantic processing could not be the reason for the semantic word finding difficulties and intact written output skills suggested that the problem with word finding was specific to some problem with accessing and operating phonological processing for speech. The authors concluded their argument by suggesting that that these semantic word finding difficulties were the result of impaired phonological output processing.

This persuasive argument proposed in 1990 suggested that the level of processing difficulty cannot be identified from speech output alone but despite this evidence researchers and therapists sometimes still use speech behaviour to diagnose level of processing difficulty. For instance, Tsuda et al. (2013) diagnosed processing difficulties on the basis of speech output. The authors hypothesised that their first client's semantic paraphasias originated from a problem processing within the semantic system. Other authors diagnose semantic processing difficulties by comparing input and output processing. Wambaugh et al. (2014) used semantic association difficulties and the presence of predominantly semantic word finding difficulties in word finding assessments arrive at a diagnosis of semantic processing difficulties for the four PWA in their semantic therapy study.

Howard et al. (2006) and Best et al. (2013) used a different basis for their differential diagnosis of single word processing difficulties. For example, Best et al. (2013) used a within group comparison method and the indicators of word length effect and presence of phonological errors to help classify their 16 participants as having proportionally more problems at the level of phonology than accessing semantics. Participants were diagnosed using the ranked z score of their best performance on either spoken word to picture matching tests (10 items) or written word to picture matching tests (10 items). Those with negative z scores were diagnosed with a semantic processing difficulty and those who did not have a negative z score were not. This mathematically derived dichotomy alongside the diagnostic criteria used by Tsuda et al. (2013) and Wambaugh et al. (2014) suggests that identifying the reason for single word processing problems is sometimes a reflection of a degree of impairment rather than a simple binary judgment.

To summarise, evidence suggests that both modular (Levelt et al., 1991) and interactive (Dell and O'Seaghdha, 1991) models of single word processing agree that the word finding difficulties experienced by PWA represent the functioning of a language system that is impaired but the models explain word finding difficulties in different ways. Bastiaanse et al. (1996) and Webster et al. (2015) support the premise that aphasia theory should be used to understand and predict why aphasia therapy may be successful, but research and expert opinion (Hillis, 1989; Lesser & Milroy, 1993; Whitworth et al., 2005) has suggested that there is little consistency between authors who match language behaviour with the underlying causes of word finding difficulties. Furthermore, interactive theories of single word processing suggest that surface language behaviours cannot be used reliably to indicate underlying processing difficulties (Caramazza & Hillis, 1990). Recent studies suggest that aphasiologists continue to link processing difficulties with speech output and sometimes the rationale for providing model appropriate therapy may be somewhat arbitrary. For these reasons, aphasia therapy research needs to specify exactly how the language processing of participants with aphasia has been affected by aphasia if it is to make claims about providing model appropriate therapy and then make conclusions about the reason why aphasia therapy had an impact.

2.4.10 *Cueing and Deblocking Therapy – Cueing*

The evidence reviewed so far has not addressed a very relevant factor that may have a significant impact on the success of any aphasia intervention. The impact of word finding techniques that use cueing and those that use deblocking are often combined in most critical evaluations of the impact of the different types of aphasia therapy. This combination may mean that a possible differential impact maybe obscured. Cues can be defined as word finding support in which therapists provide a small amount of information about the sounds of an intended target. This information is then used by people with word finding difficulties to access words that they know but cannot say. On the other hand, in deblocking techniques, therapists provide support by supplying the target word and PWA use this information to activate and produce the word for themselves.

Both cueing and deblocking therapy techniques need to be separated from successful therapy techniques that stimulate word finding by presenting a neutral auditory stimulus (Bose & Buchanan, 2007), or a picture stimulus (Chin Li & Canter, 1991; Howard et al., 1985c; Nickels, 2002; Miceli et al., 1996; Nettleton & Lesser, 1991; Patterson et al., 1983; Podraza & Darley, 1977; Rochford & Williams, 1962; Saito & Takeda, 2001), or a sentence completion cue (Podraza & Darley, 1977; Rochford & Williams, 1972). These techniques should be described as stimulation word finding therapy rather than cues. Previous reviews about phonological and semantic therapy have not addressed whether or not it matters whether people with aphasia are provided with part of a word or the whole word. The next part of this chapter will re-evaluate the aphasia therapy evidence base and investigate whether there is a difference between the impact of the two different types of word finding support.

There are different types of cues that have been used to help PWA find words, first sound cues (Chin Li and Canter, 1991; Chin Li & Williams, 1990; Patterson et al., 1983; Podraza & Darley, 1977; Saito & Takeda, 2001), first syllable cues (Patterson et al., 1983), and increasing sound sequence cues (Patterson et al., 1983). It seems that these researchers who have measured the impact of cues at the time of the investigation, do not seem to have measured its long term impact on word finding after the immediate successful elicitation of the target word.

Barton (1971) suggested that cues worked for PWA because even though PWA were unable to say a word out loud they had knowledge about the first letter of a word and how many syllables the word had. This explanation is not dissimilar to Luria's (1970) and Chin Li and Williams' (1990) proposal that first sound cues work for PWA who have intact phonological representations and the sound cue gives them the extra impetus that allows them to initiate articulation of the word.

Goodglass and Kaplan (1983) did not agree with Barton's (1971), Li and Williams' (1990) and Luria's (1970) premise and suggested that many PWA do not have access to syllabic and word form knowledge of words they cannot say. They conducted a study including 42 people who presented with an unambiguous diagnosis of either Anomic, Broca's, Conduction and Wernicke's aphasia. Their study suggested that people with conduction aphasia were the only participants who scored above chance in syllable identification tests and how many syllables a word contained. People with Conduction aphasia showed more knowledge of the first sound in words compared to people with Wernicke's and Anomic type of aphasia. This study suggests that when PWA encounter word finding difficulties they may not have conscious knowledge about the form of the word they cannot say.

The impact of cueing can be explained in quite a straightforward way using the interactive processing approach or the modular processing approach. Therapists using Dell and O'Seaghdha's (1991) single word processing model would explain the impact of cueing therapy by suggesting that more activation to phonological processing through cueing would spread sideways, forwards and backwards and enhance word access by adding impetus and cohesion to the distributed representation of the word (Schwartz et al., 2006). The modular processing explanation suggests that irrespective of whether a PWA has access to the syllabic structure of a word or not, sound cues work for PWA because the external cue is perceived (Patterson & Shewell, 1987) and boosts output processing (Levelt et al., 1999) at whichever level is problematic. Successful boosting will result in successful word finding.

Theoretically, Levelt et al. (1999) model suggests that intact self-monitoring processing may allow the PWA to self-cue. The ability to teach PWA to self-cue is an attractive prospect, for the usefulness of a technique that has limited evidence for its long term impact (Chin Li and Canter, 1991; Chin Li & Williams, 1990; Patterson et al., 1983; Podraza & Darley, 1977; Saito & Takeda, 2001), for therapists who have limited therapy time and for clients (Palmer, Witts & Chater, 2018), and for people who will have to live independently sometimes in environments that do not support their communication (Rose et al., 2013a).

Self-cueing is an active strategy where a PWA needs to be able recognise that that they have a word finding problem and decide if they want to try and use a self-cue. Once this decision has been made, with or without help of a therapist, they have to choose the self-cue they are going to use and then implement that cue. Finally, they have to use this sound to cue themselves to find the problematic word. Levelt et al., (1999) suggested that this means that PWA would need to be able to monitor abstract word phonological representations and use an intact internal feedback mechanism to perceive this to feed it forward to boost the problematic output processing that occurs in between conceptual preparation and abstract phonological word processing.

Researchers have investigated whether PWA can achieve this and can self-cue themselves and the majority of evidence seems to suggest that PWA have difficulty using self-sound cueing to support their word finding difficulties. Early work by Berman and Mclean Peelle (1976) demonstrated that just one out of five PWA in their study were able to use initial sound self-cues to find words independently. Bastiaanse and colleagues (1996) taught their participant, GD, to use one part of a self-cueing strategy during 16 weeks of twice weekly therapy. GD learnt to cue herself into finding a set of ten words by generating first sounds. In a study conducted by Bruce and Howard in 1988, none of the twenty participants with Broca's aphasia were able to learn how to self-cue. It may be that these studies did not understand and therefore did not overcome the underlying problems causing the word processing difficulties, or the participants with aphasia did not have enough cognitive flexibility to implement these strategies (Beckley et al., 2013), or self- monitor (Creet et al., 2019), or the PWA did not have enough language to self-coach themselves through a self-cueing routine, but whatever the reason, the limited evidence from self-cueing studies seems to suggest that PWA have difficulty using self-sound cueing to support their word finding difficulties. This evidence of the difficulty that PWA have in implementing self cueing strategies added to the evidence that suggests the impact of cueing therapy is relatively short lived suggests cueing may not be the most productive strand for aphasia therapy research and the most beneficial aspect of aphasia therapy provision.

2.4.11 ***Cueing and Deblocking Therapy – Deblocking Therapy***

Cueing therapy can be contrasted with deblocking therapy. When a PWA is cued into finding words they have to process the sound cue and activate the intended word themselves whereas deblocking therapy is different because it presents the PWA with the whole word that they are having difficulty producing. Deblocking therapy includes any whole word therapy technique in which the PWA needs to translate the modality in which a word had been presented and find the word in another modality. The only thing that is important with deblocking therapy is that words are used as part of the technique to support word finding (Le Dor Ze et al., 1994; Podraza & Darley, 1977; Schuchard & Middleton, 2018). This is because, if word finding difficulty is viewed as an accessing problem, word finding difficulties represent a temporary accessing problem and presenting the blocked word in a different modality will support and stimulate word finding in all alternative modalities.

In 1961 Weigl presented a series of seven single case study experiments in which he introduced deblocking therapy. He used copying written words to deblock writing to dictation with TJ a participant with mixed aphasia. He used auditory comprehension of words to deblock reading words with TM a participant with receptive aphasia and partial word deafness. The results of his investigations suggested that deblocking did have a positive effect on word finding and this result was evident up to 48 hours after therapy had occurred. He found that the technique was successful for people with different types of aphasia.

The evidence suggests that the use of whole word deblocking is beneficial. Some researchers have relied on repetition (Barry & McHattie, 1991; Creet et al. 2020; Davis & Pring, 1991; Howard et al., 1985c; Martin & Laine, 2000; Miceli et al., 1996; Patterson et al, 1983; Schuchard & Middleton, 2018; Weigl, 1961). Other researchers have used the written modality to help deblock words. Weigl (1961), Miceli et al. (1996) and Nickels (2002) used reading and Howard et al. (1985c), Marshall et al.

(1990) used matching written words to written or picture stimuli to support wordfinding. Nickels (2002) used delayed copying and other researchers have used tasks involving spoken word matching (Fisher et al., 2009; Howard et al., 1985c; Wilshire & McCarthy, 2002). The studies outlined above seem to suggest that word finding therapy that uses different modalities to word finding is successful, it generalises to other words not used in therapy and even with a with a small decrease in its impact over time, deblocking produces a long lasting change in word finding that is apparent at follow up assessment anywhere between 30 minutes and six months after therapy has stopped. This evidence seems to confirm Le Dor Ze's (1994) suggestion that word finding therapy is most successful when the therapist provides the word form as part of the therapy process.

If a therapist wanted to provide model appropriate therapy using the interactive processing perspective, the rationale for deblocking therapy would be that it allows the PWA to activate both the meaning, word and sound level representations in a pattern of reciprocal activity (Dell & O'Seaghdha, 1991), and this bidirectional activity means that the representation becomes stronger and more likely to be activated in subsequent word finding attempts (Saito and Takeda, 2001). The same explanation could be used to support model appropriate therapy using discrete processing model approach (Levelt et al. 1991) but rather than bidirectional activation the pattern of activity feeds forwards from recognition mechanisms to output mechanisms and thereby enhances the pattern of activation and subsequent likelihood of word finding at a later time.

A key difference between studies that investigate the impact of cueing and deblocking is that cueing studies tend not to measure the long term impact of their intervention. It may be that the impact of cueing is also long lasting but to date the evidence to support this claim is lacking. When investigating the impact of therapy with and without word form, the evidence strongly supports the notion that therapists should model words for therapy to have the greatest impact and this effect doesn't seem to be attributable to other factors that might typically affect the impact of therapy such as length of intervention, severity of aphasia, type of aphasia or time post onset (Darley, 1972; Kazdin, 1992; Moher et al., 2001).

Another explanation for the difference of the impact of cueing and deblocking therapies can be ascribed to Oppenheim et al.'s (2007, 2010) theories of incremental learning. Oppenheim et al.'s theory suggests that learning increases the likelihood of a representation being selected at a later time. Therefore, a PWA given the starting sound of a word or an extended first syllable cue will learn in a different way to a PWA, who given a word accesses its representation immediately. A phonological or phonetic search will increase the likelihood of another word being selected at a later time. However, a study by Fillingham et al. (2005) studied the impact of word finding techniques which provided the spoken and written whole word alongside a picture (errorless) and compared this to the impact of a first sound and first written letter alongside a picture (errorful) for seven PWA. Their study suggested that both cueing and deblocking techniques were equally successful but it has to be noted that whilst all participants had word finding problems of varying degrees, all participants were able to repeat and had some ability to use the auditory discrimination skills required for self-monitoring of spoken word output. It seems that the only factor that influenced the success of the intervention was the repeated opportunities to practise word finding was key to the success of outcomes.

2.4.12 *Word Finding Therapy Hierarchies*

Another well documented way of providing word finding therapy is to combine, cueing, deblocking or a combination of cueing and deblocking techniques into one exercise to create a cueing hierarchy. A typical combination of therapy techniques was provided by Nettleton and Lesser (1989) who used a combination of spoken, written word to picture matching and associate judgements in their semantic therapy study. Pring et al. (1993) combined reading and written word to picture matching. Ball et al. (2011) used a combination of anagram sorting, copying and repetition in their treatment protocol and Chin Li and Williams (1990) used first sound cues with lead in sentence and meaning association cues with lead in sentence. Seron et al. (1979) used spoken and written association cues, gesture and sentence completion cues. Other authors refer to these mixed therapy techniques as cueing hierarchies and there seems to be no absolute rule about how many techniques can be combined within a typical hierarchy, for example, Hillis (1989) proposed a seven stage hierarchy, Thompson et al. (2006) combined three techniques and Linebaugh's and Lehner's (1997) hierarchy, which is presented in Figure 2.3 Linebaugh and Lehner's (1997) Cueing Hierarchy, used ten levels.

Massaro and Tompkins (1994) and Linebaugh and Lehner (1997) proposed that the aim of hierarchical word finding therapy is for PWA to find words independently moreover, successful word finding could be achieved by increasing and decreasing levels of support that is provided to help PWA access target words (Conroy et al., 2009; Hickin et al., 2002; Hillis, 1989; Linebaugh & Lehner, 1997; Massaro & Tompkins, 1994; Thompson et al., 2006; Wambaugh et al., 2003). Some studies suggest that harder techniques should be used first, giving the PWA the opportunity to access words with little external help. Then easier techniques should be presented successively until one of the cues enables a PWA to access a target word by themselves (Bollinger, 1976; Marshall 1976). At the point of successful word finding the PWA should be asked to practise the target word repeatedly in response to all of the cues they had encountered previously but had been unable to respond to. Linebaugh and Lehner (1997) referred to this stimulus fading. They suggested that using a hierarchy of cues in this way might enable a PWA to use some of some of the techniques in the hierarchy as a strategy to help them self-cue. For example, gesture or description cues hierarchy may be particularly suitable for this purpose. Linebaugh and Lehner (1997) emphasise the relevance of using hierarchies because they focus on helping the process of retrieval process rather than re teaching individual words.

Figure 2.3

Linebaugh and Lehner's (1997) Cueing Hierarchy

1. What's this called?
2. Directions to state the function of the item
3. Directions to demonstrate the function
4. Statement of function by the clinician
5. Statement and demonstration of the function by the clinician
6. Sentence completion
7. Sentence completion and the silently articulated first phoneme of the
8. Sentence completion and the vocalised first phoneme
9. Sentence completion and the first two phonemes vocalised
10. Say "X"

The evidence base supports the implementation of cueing hierarchies. Studies by Spencer et al. (2000), Conroy et al. (2009), Thompson et al. (2006), Wambaugh. (2003), Linebaugh and Lehner. (1997), Massaro and Tompkins (1994), Hillis (1989), Howard et al. (1985b and 1985c), Love and Webb (1977), and Rochford and Williams (1962) all demonstrate the beneficial impact that cueing heirarchy therapy has. In Linebaugh and Lehner's (1997) study with 5 PWA their hierarchy therapy was particularly successful because it generalised to words not targeted in therapy. Thompson et al.'s (2006) single case study used a combination of sentence completion, sentence completion with first sound and sentence completion with repetition with their participant, and this hierarchy resulted in permanent changes in word finding skills but no generalisation to words not targeted in therapy.

A more recent hierarchy study by Conroy et al. (2009) compared the impact of increasing and decreasing hierarchies. Conroy et al.'s (2009) research concluded that both types of hierarchy were equally successful at helping the word finding of the 7 PWA participating in their trial and this was reflected in more accurate and quicker word finding post hierarchical cueing therapy. This research by Conroy et al. (2009) could suggest that increasing or decreasing difficulty using a series of word finding techniques may not be the reason why cueing hierarchies are successful.

Some authors suggest that cueing hierarchies work because they provide targeted stimulation to activate the intended word. Greenwood et al. (2010) targeted access from semantics to the phonological output lexicon and response buffer processing by using a combination of spoken and written sound cueing and deblocking techniques. Other authors do not provide a model appropriate rationale for the success of their therapy. For example, Spencer et al. (2000) implemented a cueing hierarchy that used rhyme judgements, sound cues, and deblocking techniques but did not specify what level of processing was being targeted with this combined cueing hierarchy comprised of different techniques. It appears that they relied on the rationale that combined sound cueing and deblocking techniques allow a PWA to achieve the extra impetus that is needed to bring activation of targeted word representations into what Barton (1971) called a “linguistic gestalt” for successful word finding.

Some of the studies that demonstrate the beneficial impact of cueing hierarchies could be criticised because the participants provided with therapy were still in a period of spontaneous recovery when it is very difficult to attribute any change in language function to the therapy that was provided (Fillingham et al., 2005; Hillis, 1989; Howard et al., 1985b). Spencer et al.’s (2000) study used a combination of part word cueing and whole word cuing and although it was successful, it lasted for 7 months and during this time, 110 therapy sessions were delivered. This level of input could not be transferred readily into the clinical setting. These criticisms aside, research into cueing hierarchies seems to suggest that they enable PWA to find words more easily. Their impact generalises to words not used in therapy and their impact is long lasting. At present, it is not clear if one part of the hierarchy has more or less of an impact on word finding.

2.5 Word Finding Therapy is Successful Because Practice Makes Perfect

The different types of aphasia therapy outlined above, phonological, semantic, sound cueing, deblocking, and therapy hierarchies all work because PWA are given the opportunity to practise word finding out loud. Word finding research conducted by Mitchell (2006) and Mitchell and Brown (1988) suggested that giving people the opportunity to practise word finding changes the way in which a word is accessed and remembered permanently. This is because word finding is an iterative process (Boyle, 2010; Gordon & Dell, 2003) and becomes quicker with repeated opportunities to practise finding word forms (Levelt et al., 1999). Word finding therapy works because once a word has been accessed, it is likely to be more accessible when it needs to be accessed again (Pulvermuller & Berthier, 2008; Wambaugh et al. 2013). This premise is supported by successful word finding therapy in which word finding practice has resulted in improved word finding skills (Creet et al. 2019; Howard et al., 1985a, 1985b; Nickels, 2002) and cueing therapy that enables a PWA to access a word only once has a beneficial impact on their ability to access that word at a later time (Creet et al., 2019; Hickin et al., 2002; Howard et al., 1985b; Nickels et al., 2002; Silkes, 2013)

Hebbian learning (Hebb, 1949) would suggest that word finding practice is most successful when PWA practice finding words (Middleton & Schwartz, 2013; Pulvermuller & Berthier, 2008). Word finding practice should happen in the best most accurate way possible without meaning or sound difficulties interfering and perhaps becoming the result of the learning process rather than the PWA learning the target word itself (Oppenheim et al., 2007, 2010). There is a significant body of evidence to support the premise that word finding therapy with word finding practise is successful (see Figure 2.4 Microsoft Excel Worksheet Summary of 68 Aphasia Noun Word Finding Therapy Studies) and this research suggests that even though aphasia may impact on the ability to learn from word finding therapy (Del Toro, 2000), PWA can acquire, retain and process information more quickly post intervention (Orrell et al., 2007). This theory provides support for Nickels' (2002) maxim that suggests practice makes perfect. Howard took an even stronger stance in 2000 and suggested that "It might for instance, be the case that the best kind of treatment for all levels of breakdown in word retrieval might be practice in saying the target word" (Howard, 2000 p.81).

2.6 Word Finding Therapy Without Word Finding Practice

Howard's opinion in 2000 is different from the one that he expressed in 1985. In 1985 Howard et al. (1985c) published an influential paper which investigated the impact of different types of aphasia therapy. Their study concluded that the impact of therapy techniques that provide phonological information, like the repetition and rhyme techniques used in their study, did not last for very long. They contrasted this with the impact of therapy techniques which required participants to access semantic information about a word. Howard et al.'s (1985c) four semantic experiments involved different semantic techniques, spoken word to picture matching, written word to picture matching and semantic judgements. Significantly, participants did not have to practise word finding when they completed these tasks and their positive impact on word finding skills led Howard et al. (1985a) to conclude that semantic techniques could help PWA to find words even though they did not involve spoken word finding practice.

As Nickels and Best (1996a, 1996b) identified, the difficulty with supporting this claim was that the four experiments Howard et al. (1985c) based their claim upon, did actually include word finding practice but practice did not happen immediately after the stimuli to provoke word finding had been presented. In Howard et al.'s (1985c) word finding experiments, therapy stimuli and assessment of the impact of that stimuli occurred with up to six intervening words. For example, the therapy and assessment block that was used within the experiment 3 semantic judgement task is presented in Table 2.1 Example Semantic Judgement Therapy and Assessment Block Used in Howard et al.'s (1985c) Experiment 3. This table shows how therapy words were treated in blocks that contained filler words and spoken word finding controls which were never provided with therapy stimulation. It also shows how little time intervened between stimulation and word finding practice.

In experiment 3, Howard et al. (1985c) stimulated and assessed six target therapy words in three experimental blocks. In addition to this opportunity to practise finding therapy words, pre and post therapy word finding assessments allowed a further two opportunities to practise word finding. This meant that, in total, participants had three opportunities to practise spoken word finding of words targeted in therapy within the semantic judgement experiment. These three opportunities to practise word finding weaken the claim of the experimenters that their research indicated that word finding practice was not an essential part of successful word finding therapy.

Table 2.1

Example Semantic Judgement Therapy and Assessment Block Used in Howard et al.'s (1985c) Experiment 3

	semantic judgement therapy	no therapy spoken word finding control	semantic judgement fillers
1			semantic judgement for filler word 1
2	semantic judgement for therapy word 1		
3			semantic judgement for filler word 2
4	semantic judgement for therapy word 2		
5			semantic judgement for filler word 3
6			spoken word finding for filler word 1
7		spoken word finding for control word 1	
8			spoken word finding for filler word 2
9	spoken word finding for therapy word 1		
10			spoken word finding for filler word 3
11	spoken word finding for therapy word 2		

The impact of practice on word finding skills also seems to have been overlooked in a meta-analysis of word finding therapy conducted by Wisenburn and Mahoney in (2006). These authors divided word finding therapy into three groups: phonological, semantic and mixed therapy. The division between semantic and phonological therapy was similar to the division discussed in sections 2.5 phonological therapy and 2.6 semantic therapy whereas the mixed category included therapy techniques which were a combination of semantic and phonological therapy and techniques that encouraged using therapy words in a functional context and within role play. Rather surprisingly, Wisenburn and Mahoney (2006) noted that they had not used word finding practice during therapy as a way of dividing therapy studies into either phonological or semantic therapy techniques. They stated that if they had included confrontation naming as part of their classification system, the majority of papers that they had studied would have been classified as mixed techniques.

If the use of spoken word finding within a study was used to help categorise the different types of therapy study into semantic, phonological or mixed techniques, most therapy studies would be classified within the mixed technique category. For example, Kiran and Thompsons's (2003) study was coded as semantic therapy because it included semantic techniques such as categorisation, semantic feature analysis discrimination and semantic yes no judgements. However, therapy items were also named in each session and used as before and after therapy probes throughout study, which for one of the three participants lasted for thirty three weeks. If participants are asked to take part in this kind of continuous assessment then practising word finding is part of the intervention itself (Bose et al., 2019; Davis & Pring, 1991; Delong et al., 2015; Fisher et al., 2009; Hashimoto, 2012; Hickin et al., 2002; Howard et al., 1995b; Howard et al., 1995c; Kiran et al., 2003; Lowell et al., 1995; Nickels et al., 2002; Pring et al., 1993).

Many semantic therapy studies are successful and give PWA repeated opportunities to practise word finding alongside other therapy methods. For instance, Delong et al. (2015) used word finding practice alongside semantic feature analysis, Hashimoto (2012) used word finding with semantic and phonological feature analysis, Kiran et al. (2003) used atypical category member training with spoken word finding, Wambaugh (2003) used word finding practice alongside phonologic and semantic cueing, and Lowell et al. (1995) used word finding in addition to association self-cueing. These examples demonstrate that studies that have been referred to as semantic therapy studies are actually investigations that let participants practice their spoken word finding skills alongside stimulating meaning accessing.

This criticism could even apply to therapy techniques which use pictures to stimulate word finding. Studies which use pictures to stimulate spoken word finding are also accessing meaning with spoken word finding (Bose et al., 2019; Chin Li & Canter, 1991; Chin Li & Williams, 1990; Davis & Harrington, 2006; Fisher et al., 2009; Francis et al., 2002; Howard et al. 1985c;; Marshall et al., 1990; Miceli et al., 1996; Middleton & Schwartz, 2013; Nettleton & Lesser, 1991; Patterson et al., 1983; Podraza & Darley, 1977; Rochford & Williams, 1962; Saito & Takeda, 2001; Wilshire & McCarthy, 2002). This is because pictures enable PWA to access meaning and spoken word finding allows PWA to access phonology (Nickels, 2002: Nettleton and Lesser, 1991).

There is only one study in Wisenburn and Mahoney's (2009) list that that could not be classified as a mixed technique. This is the study conducted by Nettleton and Lesser (1991) who presented results from six single cases in which four of their six participants received semantic therapy, the authors pointed out specifically that semantic therapy should not include word finding practice

> “to avoid repeated production by the subjects of the AT (semantic therapy) names, since semantic therapy does not involve the patient in producing the names of the items and it is germane to the model that this should not be necessary.” Nettleton and Lesser (1991, p. 146).

Their semantic therapy included four different meaning based methods: spoken and written word to picture matching, associated word to picture matching, semantic yes no judgements and categorisation. Their participants had the opportunity to practise finding the therapy items on three occasions, once before the eight week therapy trial started, once after the therapy trial had stopped and once at follow up, three months later.

After eight weeks of semantic therapy only one of the participants showed improved word finding immediately after therapy and a smaller but still significant improvement three months later at follow up assessment. This participant had received model appropriate semantic therapy. The word finding skills for the other three participants receiving semantic therapy did not improve; one participant had received model appropriate semantic therapy and two other participants with response buffer problems and had been provided with model inappropriate semantic therapy. These results provide limited support for word finding therapy that does not include spoken word finding and appears to be the first therapy study which actually measured the impact of semantic therapy without word finding.

In the wider aphasia literature there are few other examples of semantic therapy studies that do not use word finding practice as part of the therapy process, Bixley (1998), Grayson et al. (1997), and Morris and Franklin (2012). Grayson et al.’s (1997) study was conducted with one participant, LR, four weeks post onset of LR’s aphasia. The study provided spoken and written word to picture matching therapy, picture sorting and matching associate semantic therapy followed by auditory processing and sentence processing therapy. This practical and informative paper does not provide very convincing evidence to support the use of semantic therapy because it used non task specific control measures, it delivered different types of therapy at the same time, and lastly it was conducted four to seven weeks post stroke which means that it is difficult to separate the impact of therapy from the impact of general brain recovery.

Morris and Franklin's (2012) more recent study was conducted with two PWA. Franklin was the third author involved in the Grayson et al. (1997) paper. In the 2012 study, the authors investigated the impact of word judgement therapy. Initial assessment suggested that both participants, JAC and AD, had difficulty accessing meaning in all modalities, spoken, written and pictorial. These initial assessments indicated that both participants had meaning processing difficulties and may benefit from model appropriate semantic therapy. Morris and Franklin (2012) provided this by asking their two participants to decide whether a spoken word and a picture matched. The spoken word was either exactly the right word or a closely related distractor word. The effect of therapy was different for the two participants. For JAC, twelve, 30-40 minutes sessions of semantic therapy enhanced JAC's ability to differentiate between closely associated words that had been the focus of therapy and had generalised to other words that had been used as distractors. Its impact on JAC's word finding scores were not reported

Nine sessions of one to one and a half hour semantic therapy sessions did not seem to help Morris and Franklin's (2012) other participant AD's ability to distinguish between words at all. Immediately following semantic therapy his discrimination had not changed but the authors reported that his word finding skills had improved from a baseline score of 20/60 to a score of 32/60. No word finding scores were reported for either participant at follow up and this means that all that can be inferred by the information that was presented in this report of two semantic therapy interventions was that picture verification therapy had a positive impact on one participant's understanding of single words and a positive impact on the participant's word finding skills. This research again, provides evidence to support the implementation of semantic therapy but it is unclear why and who this type of semantic therapy might benefit.

In 1998 Bixley conducted a semantic therapy study in which four PWA were provided with twenty sessions of semantic activation therapy. The four participants were assessed before therapy started and a summary of the initial single word processing results are presented in Appendix 1. Model appropriate therapy would have suggested that semantic therapy would not benefit any of the four participants because they could understand more than they could say. The study participants were assessed before therapy started, after twenty weeks of activation therapy and at three months follow up and the results of the study suggested that activation therapy which focussed on listening to the meaning of words and differentiating them from closely related concepts helped the spoken word finding skills of three out of the four participants. It also resulted in generalisation of word finding to words not targeted in therapy. The difference was statistically significant the results of these analyses are presented in Appendix 2. This impact was apparent even though the participants did not have the opportunity to practise word finding throughout the twenty week therapy trial and was apparent three months after therapy had stopped.

Only the word finding skills of the second participant, who had the most severe form of aphasia, did not improve significantly. This client was unable to find words at the start of the trial and unable to find words at the end of the trial and this result suggested that activation therapy may only be relevant for PWA who have some ability to find words for themselves. Alternatively, this participant had also been given an unconfirmed diagnosis of multiple sclerosis two or three years before the onset of his aphasia following a single left sided stroke. He was subsequently diagnosed with dementia. In retrospect, this medical information may be relevant to his difficulty benefitting from activation therapy in the same way as the other three participants.

There are several improvements that could have enhanced the generalisability of the findings of Bixley's (1998) original study. Bixley (1998) did not assess written understanding or written word finding skills of her participants. This means that it is unclear whether word finding difficulties were apparent in all input and output modalities, which could differentiate between a central or modality specific problem with semantic processing. She assessed only 40 words in each modality and there seemed to be a ceiling effect for the spoken word to picture matching assessment that may have disappeared if more items had been assessed and differentiated between the participants' different abilities. Also, because Bixley (1998) did not use the same vocabulary to assess comprehension and expression, it is difficult to refute the claim that the differences between the input and output skills, particularly for participant 1 who had relatively spared word finding 30/40, could be attributable to the different vocabulary sets used to test spoken input and spoken output. These caveats aside, the research conducted by Bixley (1998) suggests that three out of four people with aphasia benefitted from activation therapy which, at the time, was delivered in a clinically possible twenty hours of therapy delivered in two one hour therapy sessions each week.

Bixley's (1998) research project contributes to the very limited evidence base that supports the implementation for meaning therapy for PWA. It confirmed Howard et al.'s (1985) experimentally driven suggestion that successful word finding therapy does not have to include word finding practice. The activation therapy study confirmed and refined Nettleton and Lesser's (1991) single case study using mixture of semantic techniques findings and demonstrated that the impact of a single semantic therapy had a positive impact on word finding skills for three PWA. The study also confirmed and extended Morris and Franklin's (2102) single case study which used semantic verification therapy and identified that the impact of activation therapy generalised to words not trained in therapy and was measurable three months after therapy had stopped. Finally, Bixley's (1998) study introduced a new type of aphasia therapy which has not been described in the literature before, activation therapy, and activation therapy will form the focus of the penultimate part of this review.

2.7 Activation therapy

Conceptually, activation therapy is based on the proposition that that language should be viewed as the dynamic function of the whole brain. Freud (1953) argued that distilling the act of language to one area of brain function, ignores the contribution of the neural networks that sub serve language function. Language and therefore aphasia, is the result of the whole brain, not part of the brain activity (Buckingham, 2006: Broca, 1865; Freud, 1953; Gowers, 1845-1915, as cited in Sacks, 1996; Head, 1926; Hughlings Jackson, 1835-1911, as cited in Taylor, 1958; Starr, 1889; Von Monakow, 1853-1930, as cited in Sarikcioglu 2018). Therefore, the problem with aphasia is one of performance not competence and activation therapy can rely on activating a brain that has been built up over a lifetime of experiences, encounters and conversations. After a stroke these memories, this functional architecture, still exists and can be used to support communication. The theory for activation therapy relies on the wealth of resources stored within the whole brain and relies on activating the functional architecture of accessible language that is distributed in whole brain networks to re access, restore, reroute or reteach language function.

Activation therapy could be viewed as the comprehension counterpart of semantic feature analysis therapy (Haarbauer Krupa et al. 1985). Instead of PWA being stimulated and supported into producing words that are associated to target words to stimulate the spoken production of the target word, PWA aphasia listen to descriptions of therapy words and explanations of the ways in which they are associated to other words. Activation therapy descriptions can last as long as required and can be as detailed as required. In Bixley's (1998) study, descriptions of therapy words lasted approximately one minute. All descriptions were produced spontaneously by the therapist who used a list of different types of word associations to prompt each individual description. The prompt list was informed by research conducted by Kogan (1975, as cited in Maruszewski, 1975) and Rinnert and Whittaker (1973). Activation therapy descriptions include the word itself and at least eight of its associations which could include a word's function, its most salient feature, its location, its category membership, another category member, a synonym, an antonym, subtypes, parts of, collocations, stereotypical sentences including the word and idiosyncratic associations. The list of associations used to prompt each description is presented in Appendix 3 Therapy Record Sheet Page 3.

An example of the transcription taken from the eighteenth session conducted with participant 1 in Bixley's (1998) activation trial is presented below. This description includes 11 associations and these are indicated by a small number when the therapist used one of them

"The next one I'm going to talk about is a gorilla[1]. The function of a gorilla well it's an animal so it doesn't really have a function, except it's alive[2] and I think the most salient feature about a gorilla is that it's a big hairy beast[3] and you'd normally find it in Africa[4]. If it's part of the category of ape like animals, things like chimpanzees[5], monkeys[6], orangutans[7], I think of as very similar to a gorilla. When I think about gorillas I do think about things like Sigourney Weaver and Gorillas in the Mist[8] King Kong[9] Fay Ray on top of the Empire State Building swatting at Spitfires flying around[10], Guy the Gorilla[11] at London Zoo where you have to polish him for good luck and he's got a really gold patch where everyone keeps polishing him"

These meaning associations could be thought of as the way in which meaning is represented in the brain (McRae et al, 2005), activation therapy relies on the premise that the amount of information we know about a word makes it easier to understand (Stahl, 2003) and that PWA have access to both the literal and experiential memories of words despite their language loss (Gardner & Denes, 1973).

Individual associations will differ between people and will be related to the way in which a word is connected to personal experience and different semantic associations may have different importance in defining meaning. For example, Lombardi et al. (2007, p. 102) pointed out that "has two humps" is highly relevant for the concept camel but "has four legs" is not so essential. The "has two humps" feature is also very distinctive because camel is probably the only word that uses this particular feature to define it. There is also evidence to suggest that semantic representations have significant overlap between associated concepts (Dell et al., 1997) and the concepts are probably organised in categories in which typical category members share many features and atypical members are represented by fewer typical but more atypical semantic features (Kiran, 2008; Kiran & Thompson, 2003; Plaut, 1996; Strauss Hough, 1993).

Single word processing theory can be used to explain how activation therapy works. The interactive processing models proposed by Dell and O'Seaghdha (1991), Schwartz et al. (2006) and Jeffries and Lambon Ralph (2006) suggest that word representation is stored as a pattern of activity connecting semantic features together. Dell et al. (1997) suggested that retrieving a word begins by activating a set of semantic features with enough connection strength to represent a given word. These features may be involved in the recruitment of other words but the pattern and strength of connection varies from word to word and a concept's activation is maintained by boosting the signal until the target word is selected. Oppenheim (2010) elaborated on this theory and suggested that each pattern of activity that represents a concept is in a state of dynamic equilibrium in which activation adjusts the representation's connections so that in the future access is stronger and quicker and in future, other similar memories will be less likely to be retrieved in its stead.

Activation therapy is based on the premise that repeated access to the semantic features that underpin word meaning will result in greater connectivity between these features. It also incorporates the proposition that the longer a representation is activated, or boosted (Dell, 1997), the stronger the representation will be and more resilient against decay. Faster and more accurate access to patterns of semantic representation will have an impact on the meaning to word form connections which in turn will support future spoken word finding (Dell, 1997). Gravier et al. (2018) even suggest that the more semantic connections, the richer the network, the better the word finding. Aphasia can be conceptualised as, word finding degradation that reduces connection strength (McLeod et al., 2000), or as activation which decays too quickly (Buchanan et al., 2003; Dell et al., 1997; Martin et al. 2004), or random noise in the system (Hildebrandt & Sokol, 1993). Lack of activation means that the feedforward and feedback spread of activation between meaning and word form does not operate effectively (Renvall et al., 2003) which results in the interconnected activation network that supports language processing being undermined (Silkes et al., 2013).

In a distributed model of single word processing, meanings are stored in a dynamic equilibrium (Oppenheim, 2010) where no semantic feature connects too strongly to any one word. Each time a word is accessed, the ensuing pattern of activity produces learning that changes this delicately balanced pattern of activity and means that it is more likely to be accessed in future whilst other non-accessed patterns of activity are less likely to be accessed in future. Retrieving an associated pattern of activity then shifts the balance back again. This means that people with aphasia are constantly adjusting the availability of words for language use in response to stimulation and activation (Oppenheim, 2010). Activation at this level of meaning representation will have an impact on word access because stronger more accurate patterns of activation with interface with corresponding levels syntactical and phonological representation (Silkes et al., 2013) bringing them closer to threshold and more susceptible to subsequent boosts of activation.

Davey et al. (2016) suggested that this network was not just notional but had some support from neuroscience. These authors suggested that semantic memory and its control mechanisms were distributed bilaterally throughout the brain and were recruited automatically following presentation of a word. New technologies that study the link between brain structure and language function (Bates et al., 2003; Geva et al., 2011; Wise, 2003) suggest that comprehension and expression are inextricably linked within a distributed language system. Hulten et al. (2019) described language processing of single words which involved a dynamic interplay between the inferior frontal and the posterior temporal cortices and Arvelo et al. (2012) suggested that language was associated with action and observation networks, systems sometimes referred to as mirror neurone networks. Cowell et al. (2000), Hickok and Poeppel (2000) and Paulesu et al. (1993) concluded that phonological working memory appears to recruit an auditory-motor system in the left frontal and parietal lobe and Fadiga et al. (2002) proposed that listening to words evokes corresponding motor tongue movement stimulation. Furthermore, Keane (2016) proposed that representations for the perception and intiation of the articulatory place where sounds are made are located together and Pulvermuller et al. (2006) proposed that speech perception in the superior temporal cortex is linked to activation within the precentral gyrus which is the site of the primary motor cortex. This body of research suggests that language representation is underpinned by multidimensional integrated functions that rely on networks distributed throughout the brain.

If interactive single word processing theory was used to explain the mechanism of activation therapy, working on accessing single word meaning representations will have a beneficial impact on single word production because comprehension and expression are inextricably linked because they are both part of the neural underpinnings of conceptual representation. Activation therapy could be viewed as a repeated focus on the target word which strengthens associative interconnectivity by recruiting the pattern of activity that defines it, its meaning and sound and, its input and output processes. It impacts on the accessibility of the target item because the summation of the associate network stimulated by activation therapy provides impetus for onward processing across the rift to stimulate word form and sound processing (Lambon Ralph et al., 2000; Levelt et al., 1999). All of the features and associations that help to define the word will also benefit from being accessed as a by-product of the focus on the target item and the resulting boost to their network, will in turn, benefit onward processing across the meaning word form rift (Lambon Ralph et al., 2000; Levelt et al., 1999). The beneficial impact of activation therapy should be apparent for both activation therapy in which spoken word finding is integral and also activation therapy which does not include spoken word finding. This is because the impact of activation therapy is on the underlying integrity of conceptual representation not its ability to convert language representations into articulatory acts.

In non decompositional theory of semantic representation (Levelt et al., 1999) semantic meaning is stored as a chunked memory that does not decompose into its constituent parts Roelofs (1997). If a PWA has problems accessing meaning, but no difficulties accessing word form or sound output processing and meaning is stimulated in much the same way as in successful comprehension therapy (Fleming, 2021), the act of accessing a chunked meaning should make that meaning more accessible the next time it is recruited for spoken word finding (Hebb, 1949; Nickels, 2002). The enhanced activation will enhance mapping between the chunked memory, the lemma and the word form representations (Howard et al, 2006; Levelt, 1991).

Alternatively, if a person does not have difficulty accessing meaning but has difficulty crossing the meaning word form rift (Lambon Ralph et al., 2000; Levelt et al., 1999), activation of sub node information will make no difference to the accessibility of the chunked node. This is because meaning information is already subsumed into part of an inaccessible combined memory (Levelt et al., 1999; Roelofs, 1997). Closely related concepts will be activated as a by-product of activating the target item (Collins & Loftus, 1975), but this secondary activation is weaker and will decrease incrementally with semantic distance from the target until it dissipates entirely.

Activation therapy will not provide the extra additional impetus that would be required to cross the meaning word form rift (Levelt et al., 1999) for either the target or its associations and will not affect the accessibility of the targeted word or its associates in future spoken word finding exercises. From this non decompositional perspective, it is word accessing which is the active ingredient of word finding therapy not the focus on meaning and meaning differences (Howard et al., 2006) and therefore activation therapy with word finding should be much more successful than activation therapy without word finding which should have no impact as it is not addressing problematic post semantic mapping (Howard et al., 2006).

2.8 Research Rationale and Research Questions

The aphasia therapy community seems to have a divided view about how to explain how and why aphasia word finding therapy works. Howard (2000), Nickels (2002) and Best et al. (2013) present the argument for word specific change as the consequence of non decompositional word representation. Conversely, Boyle (2004), Delong et al. (2015), and Kiran et al. (2011) use decompositional word representation theory as the rationale for the generalised success of their word finding therapy. Irrespective of which theory has been used to support the rationale for therapy and provide a rationale for its success, all but a few studies from both sides of the division (Bixley, 1998; Nettleton & Lesser, 1991; Morris and Franklin, 2012) use word finding practice as an integral part of the therapy process (Howard et al., 1983; Haentjens & Auclair- Ouellet, 2020).

Figure 2.4

Microsoft Excel Worksheet Summary of 68 Aphasia Noun Word Finding Therapy Studies

68 therapy studies
august 21 mdbixley.xl:

Knowing whether or not word finding practice is an important part of aphasia therapy is relevant for a number of reasons. The first is because people who cannot talk at all may not be provided therapy if there is no evidence base to support its implementation (see and click on Figure 2.4 Microsoft Excel Worksheet Summary of 68 Aphasia Noun Word Finding Therapy Studies). This collection of the word finding studies which were analysed during this research project suggests that only 3 of the 68 studies include people with severe aphasia as participants in their word finding therapy studies (Bixley, 1998; Robson et al., 1998; Visch Brink et al., 1997).

Second, if the impact of therapy is word specific, the potential for aphasia rehabilitation is limited to its impact on a restricted range of words that have been targeted in therapy (Greenwood et al. 2010; Renvall et al., 2013; Palmer et al., 2019) which will have implications for vocabulary choice and the limits the potential of aphasia therapy to ameliorate the impact of language loss. Third, a word finding therapy without word finding practice may be more acceptable to people who find word finding difficult because of an associated apraxia of speech or those who experience extreme emotional reactions to unsuccessful word finding attempts (Code, 2018). Lastly, if imperfect practise results in imperfect production (Pulvermuller & Berthier, 2008; Oppenheim, 2010) word finding therapy without word finding practice avoids the possibility of PWA learning to say words less accurately.

The first and second aims of this project and their associated objectives were designed to compare two types of activation therapy, activation therapy with word finding that included word finding practice as part of the therapy techniques and activation therapy without word finding that did not include spoken word finding practice. These first two aims addressed the imperative to understand more fully what ingredients contribute to the success of aphasia therapy and which are redundant (Baker, 2012; Cherney, 2012; Darley, 1972; Dignam et al., 2016; Enderby & Emerson, 1995).

Aim 1. To evaluate and compare the impact of activation therapy with word finding and activation therapy without word finding by

Objective 1a. Comparing word finding in both activation therapy sets with word finding in an equivalent set of no therapy control words.

Objective 1b: Comparing word finding skills in a set of words that had been provided with six weeks of activation therapy with word finding to the word finding skills in an equivalent set of words that had been provided with six weeks of activation therapy without word finding.

Aim 2. To use word finding assessments as a way of evaluating the impact of activation therapy on word finding skills by

Objective 2a: Comparing word finding skills in three initial Snodgrass and Vanderwart (1980) 260 word finding assessments with the word finding skills in the same three Snodgrass and Vanderwart (1980) 260 word finding assessments after 12 weeks of activation therapy

Objective 2b: Compare differences in word finding skills to differences in control tasks that assess sentence comprehension and cognitive processing.

Because the impact of therapy cannot be confined to the therapeutic context and aphasia therapy needs to have an impact on real life communication (Boyle, 2004; Carragher et al., 2015; Davidson et al. 2003; Del Toro, 2008; Doyle, 1995; Edwards, 1987; Frattali, 1992; Kagan, 2004; Maddy et al., 2014; Prins and Bastiaanse, 2004; Seron, 1979; Schuell and Jenkins, 1961), this study will investigate the impact of activation therapy with and without word finding on the clinically relevant (CASP, 2018) therapy experience interview. It will explore the impact of word finding therapy on functional communication which is arguably the primary focus for aphasia word finding therapy (Bowen et al., 2012; Brady et al., 2016; Palmer et al., 2019).

This type of focus has been referred to as looking for across level generalisation (Webster et al., 2015) and although the aphasia research community has found very little agreement about what and how to measure the impact of noun word finding therapy on spontaneous language there is a limited evidence base that suggests that this exploration is justified (Best et al., 2011; Davis & Harrington, 2006; Greenwood et al., 2010). In this study the third aim of the research project was designed to explore the premise that activation therapy may generalise across linguistic levels and have an impact on sentence grammar.

Aim 3. To use aphasia therapy experience interviews as a way of evaluating the impact of activation therapy on grammar by

Objective 3: Comparing word, phrase and sentence production in equivalent aphasia therapy experience interview segments

The fourth aim of this project was introduced because there is a dearth of qualitative evidence to support the provision of aphasia therapy from the people who are provided with it. This is within the context of a healthcare delivery system that has prioritised client satisfaction for more than twenty years (Department of Health, 2000, 2008) and the acknowledgement that aphasia affects not only the ability to talk but also the ability to participate fully in one's own life (Brown et al., 2011t; Hoen et al., 1997; McLellan et al., 2013; Moeller and Carpenter, 2013; Van der Gaag et al., 2005; Worrall et al., 2016). Research has suggested that aphasia can be conceptualised as a family problem (Worrall et al., 2010) because its impact extends beyond word finding difficulties and sentence grammar alone. Currently there is a need to understand the experiences of those who are provided with aphasia intervention (Department of Health, 2000, 2008; Frost & Ouellette, 2011) and this viewpoint could even be considered the most important benefit of aphasia intervention and this imperative was the reason for the fourth aim and its associated objective

Aim 4. To use aphasia therapy interviews as a way of understanding the impact of activation therapy on the experience of living with aphasia by

Objective 4. Using thematic analysis of therapy experience interviews to identify the qualitative reported impact of participation in the activation therapy trial

2.9 Chapter 2 Summary

Chapter 2 presented a review of the literature that informs aphasia intervention. Aphasia therapy research has been influenced by the cognitive neuropsychological approach to the assessment and intervention for single word processing problems since the 1980's (Howard et al., 1985c; Patterson et al., 1983). A review of the literature surrounding noun word finding therapy studies suggested a theoretical and clinical division between techniques that target semantic processing and techniques that target phonological processing. The review suggested that aphasia therapy is better if it is targeted at processing breakdowns rather than processes that are intact (Howard et al., 2006).

The review also identified that the semantic phonological divide may have obscured an important factor that may have affected the impact of different types of aphasia therapy techniques. Analysis of the literature suggested that techniques that provide a fragment of information about the sounds in a word are less successful than techniques that incorporate the whole word as part of the therapy technique. Techniques that provide PWA with target words, whether in written or spoken modalities, demonstrate better skill acquisition, generalisation, and skill retention.

Providing a theoretical rationale for therapy techniques and providing a rationale for skill acquisition has always been considered an important part of evaluating the impact of aphasia therapy (Baddeley, 1993). The modular approach to aphasia therapy is not the only theory to underpin aphasia intervention. Authors such as Lambon Ralph et al (2002) and Wilshire (2008) have suggested that an interactive account of single word processing may also provide a different way of conceptualising why aphasia therapy might work. Fewer studies have presented their work within this equally plausible interactive conceptualisation of single word processing even though it is supported and written about by authors such as Dell and O'Seaghdha (1991) and Schwartz et al. (2006).

Most aphasia therapy noun word finding therapy studies to date have identified that just practising word finding has a beneficial effect on finding words (Creet et al., 2019; Howard et al., 1985c; Nickels, 2002). This type of research is relevant for PWA who can find words but may have limited applications for people with severe aphasia whose word finding who have difficulty accessing therapy that includes word finding as an essential part of its process. This present study assesses the impact of an innovative therapy technique that has only been reported once before in the literature. In the original and only study about the impact of activation therapy (Bixley, 1998), the author of this current project, provided twenty sessions of twice weekly activation therapy for four participants with varying degrees of aphasia. Activation therapy was based on the premise that activating meaning without practising spoken word finding could help PWA to find words. Activation therapy proved useful for three of the four participants in Bixley's (1998) therapy study and added to the limited evidence base that supported word finding therapy without word finding practice (Nettleton and Lesser, 1991; Morris and Franklin, 1997). This therapy trial with seven people with aphasia has been designed to address in more detail Darley (1975) and Enderby and Emerson's (1995) still unanswered directives to find out what parts of aphasia therapy contribute to its success and which may be detrimental. It will compare the impact of activation therapy with word finding to the impact of activation therapy on, word finding skills, sentence grammar and the lived experience of participating in the therapy trial.

Chapter 3 Methodology

3.1 Introduction to Chapters 3, 4, 5 and 6

Having reviewed the evidence base for using aphasia therapy techniques to help PWA find words and contextualising activation therapy within possible theoretical frameworks and the limited research base that supports aphasia therapy without word finding practice, this chapter will describe the methodology of the current research project which was designed to evaluate the impact of activation therapy with and without word finding for seven participants with aphasia and their therapy trial partners. This mixed method investigation used both quantitative methods to (aims 1, 2, and 3) and qualitative methods (aim 4) to evaluate the multifaceted impact of activation therapy.

Although activation therapy was delivered in the same way to each of the seven participants the methods that were used to assess its impact were independent from one another. The methods were complementary but each had a particular rationale for its use, the way it evaluated the data, the kind of results it identified and the discussion points that ensued. Quantitative methods were used to measure the impact of activation therapy on word finding and sentence structure and qualitative methods were used to understand and explain the wider experience of therapy. The three methods used to evaluate the impact of activation therapy were, word finding assessments, grammatical analysis and thematic analysis.

To aid clarity, this chapter, Chapter 3, will present information that is general and relevant to all three ways of evaluating the impact of activation therapy and will include information about 3.2 Mixed Methods, 3.3 Research Design, 3.4 Participants 3:4, 3.5 Materials 3:5, 3.6 Therapy Experience Interviews and 3.7 Procedure. The methodological information that is only pertinent to one method will be presented within that individual chapter. In the same way, critical evaluation of each method will be compartmentalised and addressed within the relevant chapter. Discussion and criticism that applies to all three evaluation methods will be presented in General Discussion in chapter 7.

Chapter 4 begins with an introduction to the three results chapters and then focuses on the impact of activation therapy on word finding. It is divided into sections which cover, 4.2 Initial Single Word Processing Assessments and 4.3 Single Word Processing a1, a2 and a3. It will present a description and rationale for the way in which the word finding assessments were measured and will present results from both a group and individual perspective. statistical analysis 4.5, control task 4.6, The discussion will focus on the implications of these findings and offer some findings that are not easily explained by current models of single word processing.

The grammatical results are presented in chapter 5. Comparable extracts from therapy experience interviews were analysed to see whether activation therapy had affected spoken language production. After an introduction to the chapter 5.1, the rationale for using grammatical analysis, the dual purpose of the data collection process, the grammatical analysis process and the results obtained from this method will be described. The chapter will also demonstrate how the interview verification process enabled people with severe aphasia to participate in therapy experience interviews and therefore contribute to the research project. In the final discussion section 5.8 Grammatical Results Discussion, results will be reviewed in the context of the current evidence base that has suggested that therapy may have an impact on word class usage, lexical diversity, clause structure.

Chapter 6 is the last results chapter and focuses on the qualitative experience of undergoing a course of activation therapy. The chapter starts with an introduction to the Thematic analysis (Braun and Clarke, 2006) chapter 6.1. This introduction is followed by an explanation of the rationale for using thematic analysis 6.2 and a description of the thematic analysis process 6.3 and findings 6.4. This part of the thesis will demonstrate the way in which interview data was used to assess the impact of therapy on the person living with aphasia. The themes are aligned with research into the impact of aphasia on the person and also the very limited evidence base that suggests that impairment based therapy can have a positive impact on the way in which the PWA experiences life. The final part of this chapter will present a triangulated and integrated argument that suggests the specific impact of activation therapy on noun processing that is evident in different ways in all three analyses.

3.2 Mixed Methods

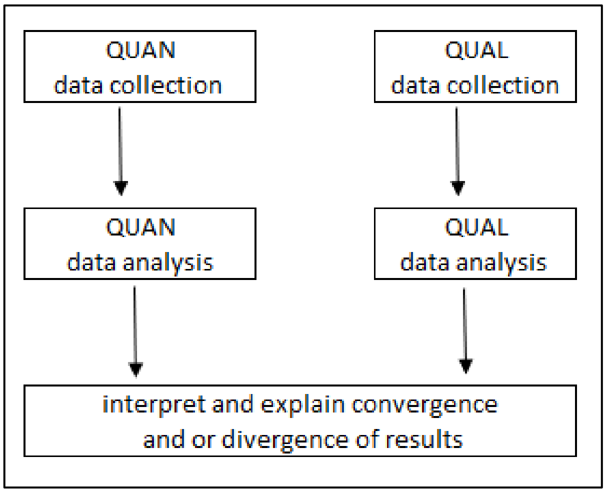
Mixed methods is a term that is used to describe a single study in which two different methods are used to investigate an area of interest (Creswell et al., 2008; Plano Clarke & Creswell, 2008; Tashakkori & Teddlie, 1998; Zhang & Creswell, 2013). The two methods are used to produce a triangulation of agreement (Caracelli & Greene, 1993; Jick, 1979) or to overcome the inherent weaknesses of monomethod investigations (Tashakkori & Teddlie, 1998). The design used in this investigation resembles very closely a design that has been referred to as concurrent triangulation design (Creswell et al., 2008). In a concurrent design, qualitative and quantitative data collection is followed by qualitative and quantitative data analysis and finally the results from both types of investigation are compared and interpreted within the context of the area of inquiry. A graphic representation of this basic design is presented in Figure 3.1 Typical Concurrent Triangulation Design

Based on Creswell et al., (2008, p.181) and is based on the model created and produced by Creswell et al. (2008 p. 181).

The mixed methods design used in this study was based on the need for the assessment and therapy procedures used in this therapy trial to be clinically relevant. CASP (2020) highlight the need for research to be relevant locally and all procedures used in this study were chosen because they were already used in clinical practice or could be readily transferred into the local Speech and Language Therapy context. Word finding assessment data collection was facilitated by the use of an openly accessible set of standardised pictures (Snodgrass & Vanderwart, 1980). Conversations with PWA and their significant others about the impact of aphasia are already a standard part of the aphasia therapy intervention pathway (Bixley et al., 2012, 2014; Shrubsole et al., 2017; Simmons Mackie et al., 2016, Simmons Mackie et al. 2020). Furthermore, Brady et al. (2016) highlight the need for aphasia therapy to have an impact on functional communication. The inclusion of the therapy experience interview as a way of measuring outcome was thought to be a clinically relevant data collection method (Sandelowski et al., 2009).

Figure 3.1

Typical Concurrent Triangulation Design Based on Creswell et al., (2008, p.181)



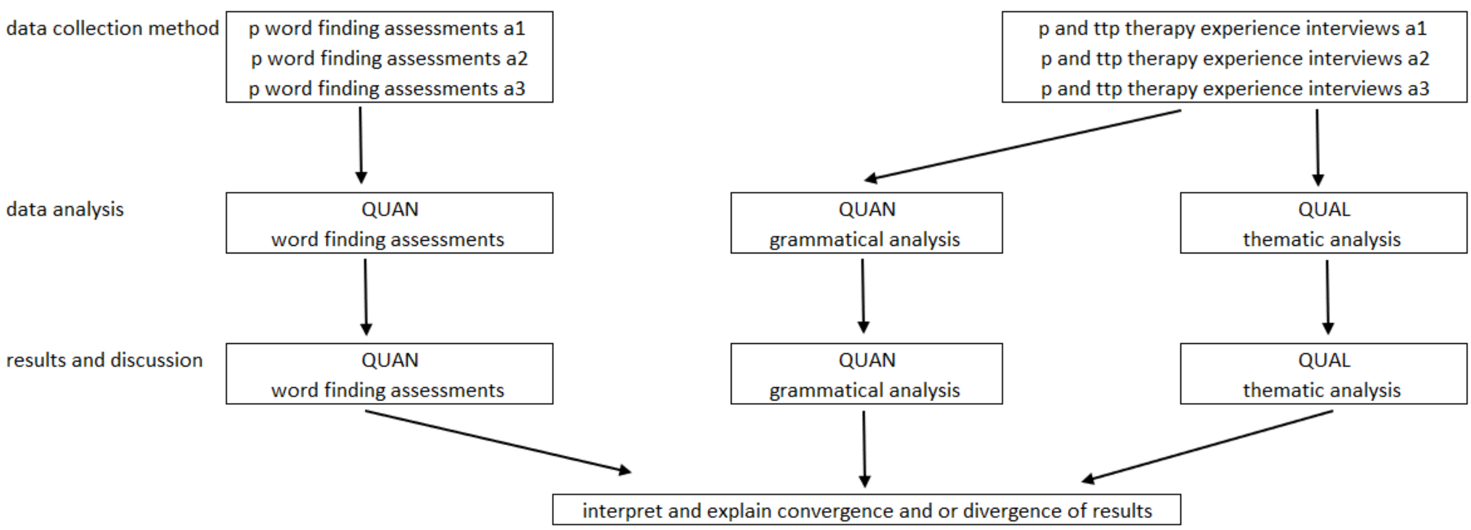
Another consideration that guided the design of this mixed methods study was the need to minimise the impact of assessment as a form of intervention (see 3.5.2 Single Word Processing Assessments for a detailed argument and justification for economy of effort in assessment within aphasia therapy trials). Also, research into the delivery of aphasia therapy suggests that therapy time is a scarce resource (Code & Heron, 2003; Katz et al., 2000; Care Quality Commission, 2011; Palmer et al., 2018) and the corollary of this is that the opportunity to conduct language assessments is also very limited. These two factors suggested that if the results of this research project were to be relevant for both the aphasia therapy research community (Brady et al., 2016) and the clinical therapy context (CASP, 2020), assessment needed to be exhaustive but economical. This imperative links every well with the use of the concurrent triangulation design in this project because the design has a shorter data collection period than other mixed method designs and it is feasible and efficient (Creswell et al., 2008; Kemper et al., 2003)

The drive for reducing assessment loading was the reason for a slight alteration to the mixed methods concurrent triangulation design presented in Figure 3.1 Typical Concurrent Triangulation Design Based on Creswell et al., (2008, p.181). Creswell et al.'s (2008) design seems to suggest that the researcher either gathers qualitative data for qualitative analysis or gathers quantitative data for ongoing quantitative analyses. In this present study word finding assessments were used to gather quantitative information about word finding skills whereas therapy experience interviews were used to gather two types of evidence. First sentence processing skills were analysed and reported in a quantitative way (Crystal, 1982), secondly, the impact of activation therapy was analysed and reported in a qualitative way (Braun and Clarke, 2006). Sandelowski et al. (2009) would explain this alteration to Creswell et al.'s (2008) concurrent triangulation design by suggesting that data collection methods are not inherently qualitative or qualitative. These researchers would argue that data collection is an active process which requires the researcher to decide what kind of data to focus on, data-as-taken rather than data-as-given (Lanigan, 1994). For this reason, in this research project, a seemingly clear cut qualitative interview was used for both qualitative and quantitative data collection. The adapted mixed method design used in this study is presented in Figure 3.2 Concurrent Mixed Two Method Data Collection and Three Method Data Analysis Research Design Used in this Activation Therapy Trial.

Morgan (2008) referred to this as a pragmatic mixed methods approach. In this pragmatic approach qualitative and quantitative methods are used to create research questions and guide the collection and analysis of the different types of data derived from an investigation. The mixed method approach was adopted because the effects of aphasia are multifaceted. Aphasia affects both language accessing skills and the lived experience of those affected by it. It was therefore necessary to approach the investigation into the impact of therapy in two different ways. It could be argued that both of these paradigms are needed to inform the design of any investigation into the effects of aphasia therapy and to exclude one, would render the investigation less meaningful (Green et al., 1989). In this project a mixed methods research design was adopted to counteract the inherent shortcomings of the quantitative and qualitative approaches. The different methods were to elaborate, enhance and corroborate each other (Green et al., 2015).

Figure 3.2

Concurrent Mixed Two Method Data Collection and Three Method Data Analysis Research Design Used in this Activation Therapy Trial



Plano Clarke and Creswell (2008) suggested that a mixed methods design was one that had the facility to combine, link and integrate different types of research methods within its complex research procedure. To date, the mixed methods approach has been used very infrequently to assess the impact of aphasia therapy, however recent papers by Hux et al., (2021), Devanga et al., (2020) and Harrison et al., (2020) suggest that the approach is being employed by researchers who want to evaluate their work from both quantifiable and experiential perspectives. Even where methods have been combined within a single study (Mumby & Whitworth 2012; Van Der Gaag, 2005) researchers have very infrequently located themselves within a mixed methods research design paradigm. In the past, most aphasia research seems to approach the aphasic phenomenon from either the quantitative perspective (Howard & Gatehouse, 2006) or the qualitative perspective (Barrow, 2008; Hinckley, 2005; Pound, 2013).

This intervention therapy trial was designed to evaluate the impact of an impairment based therapy that might extend beyond improved word finding skills to other contexts in which language is used. Pound et al. (2001) and Howe et al. (2012) suggest that the impact of therapy should not be restricted to word finding skills alone and Beeson and Robey (2006) described the three expected outcomes related to aphasia intervention as: direct treatment effects, generalisation to untrained items and generalisation to connected speech. They suggested that these different outcomes could be considered as hierarchical and Kelly et al. (2012) proposed that these different types of generalisation also reflected increasing levels of difficulty. Pring (2004) extended this argument further and suggested that improved word finding may result in changes in the activity and participation in people with communication difficulties. Behrmann and Byng (1992) also wrote about this viewpoint and suggested that the ideal outcome of therapy would be widespread generalisation of therapy skills. However, they conceded that even therapy specific change would also be acceptable. Despite the acknowledged desirability of generalisation from therapy only a few studies report this type of success (Boyle and Coelho 1995; Conroy et al. 2009; Franklin et al. 2002; Hillis 1989; Kiran and Thompson 2003). The use of interviews as part of the research project is based on the premise that the in addition to gains in language function, therapy should also have an impact on the perceptions and experiences of people with aphasia and their ttps.

There is very little agreement about how to measure the impact of aphasia therapy and it seems that each researcher needs to be able to present a reasoned argument for the choices that have been made in order to conduct a therapy trial. The two main approaches to measuring the impact of aphasia therapy are the single case study (Barlow and Herson, 1984; Beeson & Robey, 2006; Howard, 1986; Pring, 1986: Tate et al., 2008) and the randomised controlled trial (Bowen et al., 2012; David et al., 1982; Palmer et al, 2019). Single case study designs could be criticised because they lack generalisability to the wider population (Kazdin, 1978, 2016) and randomised controlled trials could be criticised because they fail to consider the impact of therapy on the individual (Kovarsky, 2008). There seems to be very little middle ground between the two approaches to research into the impact of aphasia therapy. For example, the Cochrane Collaboration, Speech and Language Therapy for Aphasia Following Stroke Review (Brady et al., 2012) excluded single case study research from their comprehensive randomised controlled trial (RCT) investigation into the evidence base for aphasia therapy.

It is difficult to define how aphasia therapy affects the PWA because unlike the cure for tuberculosis (Howard, 1986) or a dose of aspirin (Enderby and Emerson, 1995) aphasia interventions are multifaceted and difficult to define and measuring their impact needs to be sensitive and multifaceted enough to capture that impact. Recent randomised controlled trials have had difficulty defining the therapy they provided in detail (Palmer et al. 2019; Palmer et al., 2014; Bowen et al., 2012) and may have had difficulty measuring the impact of therapy in enough detail to identify the way in which aphasia therapy affects the person with aphasia (Fleming et al., 2021: Palmer et al., 2019). For example, in Palmer's (2019) trial, gains in functional communication were assessed using the Therapy Outcome Measures for Speech and Language Therapists, Physiotherapist, Occupational Therapists and Rehabilitation Nursing (Enderby et al., 2006). It may be that self-managed computer therapy resulted in no generalisation to functional communication but it may also be that the eleven point activity rating scale used to measure functional communication at the beginning and end of therapy did not identify gains in functional communication that were large enough to register on an eleven point scale.

The methods and analysis used in this study were chosen to be able to harness the strengths of both approaches whilst addressing their weaknesses. The choice of research design, methods and analysis were influenced by The Cochrane Review Study Characteristics Categories (Brady et al., 2016), Critical Appraisal Skills Programme Randomised Controlled Trials Checklist (2020), Critical Appraisal Skills Programme Qualitative Checklist (2020), Consolidated Standards of Reporting Trials (Moher et al., 2001), Physiotherapy Evidence Database Scale (Maher et al., 2003), Single-Case Experimental Design Scale (Tate et al., 2008) and the Template for Intervention Description and Replication Checklist (Hoffman et al., 2014). The way in which these standards informed the choice of method and its analyses will be discussed in each of the three methods chapters and the degree to which this research achieved these benchmarks will be critically reviewed in each of these chapters and within 7.3 Limitations of the Research Project.

3:3 Research Design

This research project took place in two phases. Four PWA participated in the first phase of the study and a further three PWA participated in the second phase of the study. The therapy trial phases were exactly the same but the research had to happen in two phases because of time constraints. In the study, the author, a qualified Speech and Language Therapist conducted all seven therapy investigations. In both phases of the investigation, the participants recruited to this therapy trial took part in a stratified and randomly allocated, three times repeated measure, two therapy technique counterbalanced crossover therapy trial to measure the impact of activation therapy with and without word finding for people with aphasia. Assessments were conducted before therapy began and these will be referred to as a1, at therapy crossover which will be referred to as a2, and at the end of therapy which will be referred to as a3. Assessment phases lasted three weeks and therapy phases each lasted six weeks. Figure 3.1 is a graphical representation of the research design used in this project. Post therapy follow up after a3 assessment was not possible because of the time constraints of the original study.

Pre therapy assessment sessions served several purposes. First, in three once weekly assessment sessions before therapy began, participants were asked to complete three lengthy word finding assessments and these assessments were used to identify whether participants had a word finding problem. They were also used to ensure that the word finding problem was stable and would not respond to repeated opportunities to practise naming word finding alone. Practising word finding has been identified as a therapy technique that could that could impact positively on finding skills (Nickels, 2002; Schmidt & Bjork, 1992) and activation therapy would have limited relevance for participants who only had to practise word finding for word finding skills to improve. Each participant's individual word finding assessments were used to identify words that had caused word finding difficulties and therefore could be used within individual activation therapy trials as therapy words or words that would act as no therapy control items.

Additionally, initial assessment sessions were used to conduct assessments of single word processing, sentence processing and cognition. Single word processing assessment allowed the investigation of whether the impact activation therapy was associated with any particular underlying single word processing difficulty. Formal assessments of cognition and sentence processing were conducted to act control assessments which would not improve as a by-product of activation therapy. Finally, assessments sessions were used to interview participants and their therapy trial partners, who will now be referred to as ttps, about the experience of participating in activation therapy. These interviews would be used to evaluate the qualitative impact of activation therapy.

If participants wanted to continue with the trial after these initial assessments, they were randomly allocated to one of two therapy pathways. One participant withdrew from the therapy trial during the initial assessment phase and therefore was not allocated to a therapy pathway but the remaining eight participants were allocated to one of the two therapy pathways outlined in Figure 3.3 Graphical Representation of the Stratified and Randomly Allocated Repeated Measures

Counterbalanced Crossover Therapy Trial Design. The randomisation process was adapted to accommodate the different levels of severity that the seven participants presented with. Stratification is a technique recommended by Moffett (1991). She suggested that stratification should be used when participants show evidence of characteristics that might affect the outcome of studies, factors such as age, gender or length of illness. In this study, It would be unfortunate if all participants with severe aphasia were allocated to the same therapy pathway and all participants with milder types of aphasia were allocated to a different pathway. In this project participants were stratified into those who were able to find words and those who were not so able to find words and presented with severe aphasia (see 4.3 Single Word Processing a1, a2 and a3 Procedure for more information about this stratification process). Participants in both groups were randomly allocated to one of the two therapy pathways.

Figure 3.3

Graphical Representation of the Stratified and Randomly Allocated Repeated Measures Counterbalanced Crossover Therapy Trial Design

pathway 1 participants p1, p4 and p7	weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	activity	a1	a1	a1	atherapy with	atherapy with	atherapy with	atherapy with	atherapy with	atherapy with	a2	a2	a2	atherapy without	atherapy without	atherapy without	atherapy without	atherapy without	atherapy without	a3	a3	a3
pathway 2 participants p2, p3, p5 and p6	weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	activity	a1	a1	a1	atherapy without	atherapy without	atherapy without	atherapy without	atherapy without	atherapy without	a2	a2	a2	atherapy with	atherapy with	atherapy with	atherapy with	atherapy with	atherapy with	a3	a3	a3

Note. atherapy = activation therapy.

The crossover counterbalancing design was used to overcome two challenges. The first was to avoid the order effect that might occur if one therapy was always provided before the other one (Perreault, 1975). The second challenge was the need for a non-therapy control measure from which the impact of activation therapy could be inferred. This crossover counterbalancing design allowed the comparison of the two types of activation therapy to be measured in the same person. Single case study research design, the most frequent research design used in 41% of aphasia investigations according to Perdices and Tate (2009) and Beeson and Robey (2006), suggests that it is not appropriate to match people with aphasia and suggests that people with aphasia are individuals and different to other people with aphasia in many ways. They have individual life experiences, educational attainments, emotional resilience, family history, medical history, brain anatomy, brain functional architecture, brain damage and different responses to therapy. The crossover counterbalancing design goes some way to overcome the impact of these individual differences. This is because the same person's response to two different therapy conditions are compared rather than comparing the impact of two different therapy techniques on different people.

This study used control measures within the study in a way that did not overly increase the amount of assessment that PWA had to undergo. Kazdin (1992, 2016) suggested that a suitable control measure could be a behaviour that is commensurate with the therapy task but a skill that is not expected to improve as a by-product of therapy. Measures of sentence comprehension and cognitive skills had remained unchanged in Bixley's (1998) series of four single case studies in which 3 out of 4 participants demonstrated the positive impact of activation therapy on noun word finding skills and Basso et al., (1973) and Helm Estabrooks (2002) had found no relationship between language and visual analogic thinking. These precedents were used as the basis for the decision to use The Test for the Reception of Grammar (Bishop, 2003) and The Standard Progressive Matrices (Raven, 2006) as within participant control measures. These assessments have the advantage of being readily accessible to Speech and Language Therapists in clinic and require no additional training beyond their professional qualification Helm Estabrooks (2002).

It is clear that these assessments are not exactly commensurate with word finding. They measure skills that are allied to word finding but Kazdin (1992, 2016) would not consider them specific enough to be used as exact spoken word finding controls. The only real within participant control measure for word finding therapy is to compare the impact of therapy on a set of commensurate words (Funnell & Sheridan, 1995) that did not receive any therapy at all. For this reason, words that had caused word finding difficulties in initial a1 assessments were sorted into three equal groups, an activation therapy with word finding group, an activation therapy without word finding group, and a no therapy control group.

Using word finding skills as a control measure is also problematic. This is because one of the aims of successful word finding therapy is generalisation, such as that found in the studies conducted by Lowell et al. (1995), Bixley (1998), Fisher et al. (2009) and Delong et al. (2015) but this desirable impact poses a problem for research design. Therapy trials need to be able to evidence that the impact of therapy is greater than the impact of generalisation. In the present study this will be achieved by comparing word finding in two groups of words used in therapy with word finding in a group of words that were not used in therapy at all. The impact of activation therapy will be inferred by improved word finding in the two activation therapy word finding sets accompanied by a commensurate lack of improvement in the no therapy word set and ultimately the lack of improvement in the three combined control measures, the no therapy word set, the Test for the Reception of Grammar (Bishop, 2003), The Standard Progressive Matrices (Raven, 2006).

3.4 Participants

3.4.1 *Ethical Considerations, Accessibility of Informed Consent Procedure*

This project was approved by the Faculty of Health and life Sciences Research Ethics Committee. Research into ensuring that consent from PWA is informed, has suggested that this process should occur face to face. It should also be combined with the use of aphasia friendly written materials (Jayes and Palmer, 2014). This research project incorporated these recommendations into the aphasia friendly process of participant recruitment. Participants with aphasia were contacted through voluntary organisations for PWA in the local area. They were recruited at organisational meetings that occurred once or twice a month. In these meeting, each prospective participant was given an information sheet (Appendix 4 Participant Information Sheet), consent form (Appendix 5 Participant Consent Form) and a copy of the dates of the study to take away with them.

During the meeting, each part of the project and consent form was presented and talked through in detail. Facilitated discussion allowed prospective volunteers to ask questions after each point. If volunteers indicated an initial willingness to consider participation, they were asked to take the written information away and discuss the project with an interested family member. Interested volunteers were given details about how to contact the lead researcher and an initial appointment was made with the prospective participant and their advocate who would act as the PWA's ttp.

At the initial appointment, the proposed project was explained to the volunteer and their advocate. They were given the opportunity to discuss any questions they had. At the end of this meeting there were two possible outcomes for the participants. Outcome 1, the participant and their advocate were enrolled on the research project and both signed the consent forms. Each part of the consent form was initialled to show consent for each proposition. The lead researcher kept one copy of the signed from and the participant was given the other. This was also recommended in the literature about gaining ongoing consent and allowed participants and their therapy trial partners to review what they had agree to at any stage in the project (O'Neill, 2003). Outcome 2, the volunteer chose not to enrol on the project. The prospective participant and their advocate were thanked for their interest in the project and assured that their lack of consent was entirely acceptable.

3.4.2 *Ethical considerations, Accessibility of Information Sheet and Consent Form*

In 2003 O'Neill suggested that informed consent is given when volunteers agree to participate in a research project without deception or coercion, this permission is difficult to obtain from people who have problems accessing language. Indeed, Smith et al.'s (2009) review into the accessibility of hospital information suggested that 45% of people with stroke could not understand the information they had been given. Because the project elicited permission for participation in a lengthy research project and for separate permission to use recordings of the research process for conferences, teaching, assessment and therapy materials, it needed to be explicit about what participants were agreeing to because these materials, once published would be permanently available. For this reason, the information sheet and consent form used in this project conformed to the principle of gaining informed consent by presenting information in an accessible way. They also conformed to the premise that informed consent is not an absolute decision but an ongoing process that can be withdrawn at any time throughout the project (O'Neill, 2003).

The evidence base (Aleligay et al., 2008; Dalemans et al., 2009) suggests that written language can be assessed for readability using The Flesch-Kincaid Readability Index (Brennan et al., 2005; Kincaid et al., 1975; Webster et al., 2013). Dalemans et al. (2009, p952) suggested that a United States reading grade of 5-6 should be used as an entry point for PWA and also recommended that sentences should be reduced to their "essence" and range from 4.6 to 11.5 words in a sentence. Aleligay et al. (2008) suggested that written materials for PWA were too complex if they were equivalent to an American reading grade of 9 or above. The information and consent form designed for this study were assessed using the Flesch-Kincaid Readability calculator. When the project title was removed, the written language used in both of these forms was equivalent to a reading grade of 5.9 and contained an average of 11.2 words per sentence.

In addition to the readability of the consent form, other adaptations were made to maximise the accessibility of the information and consent form. Font size 14, high frequency words, simplified syntax and white space between key points were used to help participants to access the written information (Brennan et al., 2005: Dalemans et al., (2009); Jayes & Palmer, 2014; Luck & Rose, 2007; Penn et al., 2009). Consistency of format, using the same words as carrier phrases and chunking of information was also used to increases the accessibility of the forms used in the study. Pictures were not used in the creation of the information sheet or the consent form because, as Brennan (2005) highlighted, they are not always useful and may not aid reading comprehension. This is especially important when the pictures that are used do not represent the meaning of complex concepts such as the concept of informed consent that was used in this study. Finally, colour was used to help navigation around the forms (Bixley et al. 2011).

3.4.3 *Participant Selection Criteria*

Participants in this study were recruited if they experienced aphasia as a consequence of a first dominant hemisphere stroke and were least six months post onset of aphasia. Prospective participants were not recruited to the study if they had communication difficulties that were attributable to dysarthria. Brady et al. (2012) also excluded that participants with sensory losses or speech difficulties due to a muscular weakness or dysfunction such as dysarthria in their meta-analysis of Speech and Language Therapy for aphasia following stroke.

Because participants were recruited from a voluntary organisation, they did not have detailed knowledge of the location and severity of the brain damage that resulted in their aphasia. However, all volunteers were asked to complete a brief clinical history form to enable a description of the people who participated in this study. This level of detail is useful because it can be used to generalise research results to other individuals with aphasia who present with similar personal characteristics. Tate et al. (2008) suggested that age, gender, injury and an evaluation of severity of aphasia evaluation were sufficient to indicate whether results could be applied to other individuals. Brady et al. (2012) suggested that education, handedness, gender, first language, severity of aphasia and time post onset should also be included in participant descriptions. The participant selection criteria created for this study used a combination of these precedents. Participants in this study met the inclusion criteria listed below and

1. were discharged from local National Health Service Speech and Language Therapy Services
2. had been diagnosed with aphasia as a result of a single left side stroke
3. had experienced aphasia for more than six months
4. had adequate assisted sight to see black and white drawings
5. had adequate assisted hearing to hear the spoken voice

6. did not have dysarthria that affected intelligibility and swallowing

3.4.4 *Participants' Biographical Data*

The first four participants to respond to the request for volunteers who fulfilled the selection criteria were selected for the first phase of the research project. Another five participants were recruited the following year. A total of nine initial volunteers. Seven out of nine participants completed the activation therapy trial. One participant decided to withdraw halfway through the initial assessment phase. She found attending and participating in assessment too difficult. The second participant completed the first part of the therapy trial but found it difficult to stay awake in therapy. He withdrew from therapy because of ill health. Therapy results from these two participants were not used in this report. Of the seven participants who completed the therapy trial; four were men and three were women. Their average age was 53 (range 42-67). They all spoke English as their first language and their ethnicity could be described as White (GOV.UK, 2020). All participants had suffered a left sided stroke which had resulted in aphasia. Even though the trial recruited participants from voluntary organisations it was possible to obtain exact brain scan information for p2, p5 and p6 and p7.

Time post stroke ranged from 1 year and 7 months to 17 years. All participants had passed the period of time post stroke when spontaneous recovery might have been the reason for any recovery observed during the trial. Six out of seven participants were right handed but all had been diagnosed with aphasia by the Speech and Language Therapy services they had accessed at the time of their stroke. The Aphasia Severity Scale (Goodglass & Kaplan, 1983 p28) presented in Table 3.1 Aphasia Severity Rating Scale was used to measure the severity of aphasia experienced by participants. On this scale a score of 0 represents someone with aphasia who has no speech or understanding. The top score of 5 represents a problem that is hardly discernible but the person experiencing aphasia feels that their access to language is not as good as it had been before their stroke.

Table 3.1

Aphasia Severity Rating Scale

score	Qualitative description
0	No useable speech or auditory comprehension
1	All communication is through fragmentary expression: great need for inference, questioning, and guessing by the listener. The range of information that can be exchanged is limited, and the listener carries the burden of communication.
2	Conversation about familiar subjects is possible with help from the listener. There are frequent failures to convey the idea, but the patient shares the burden of communication.
3	The patient can discuss almost all everyday problems with little or no assistance. Reduction of speech and/or comprehension, however makes conversation about certain material difficult or impossible.
4	Some obvious loss of fluency in speech or facility of comprehension, without significant limitation on ideas expressed or form of expression.
5	Minimal discernible speech handicap; the patient may have subjective difficulties that are not obvious to the listener.

Note. Goodglass and Kaplan (1983, p28).

Three participants were rated as experiencing a severe aphasia at the beginning of the trial and scored 1. This score suggested that they were unable to communicate without a conversational partner using questioning, guesswork and inference during conversations to enable interaction to happen. Three participants were rated as 2 on the severity scale. This score suggested that the burden of communication was shared but aphasia affected the participants' ability to convey information very frequently. One participant was rated as 3 on the scale. This score suggested that everyday communication was relatively easy for this participant but discussions about complex material was very difficult and sometimes impossible.

None of the participants were in paid employment at the time of the study. However, all had been employed, had caring responsibilities or had combined working with caring responsibilities. Study participants had been employed in a variety of occupations. A range that encompassed the whole spectrum of Yale's Four Factor Index of Social Status (Adams and Weakliem, 2011). One was a cleaner, one was a carer, one was a telephone engineer, one a teacher, one a care home manager, and two were small business owners. The seven ttps had varying relationships with the participant from father, daughter, partner, husband and wives. They had been employed in a range of occupations and their ages ranged from the 30s to the 60s. Table 3.2 Participant and Therapy Trial Partner Biographical Data collates participants' and ttps' biographical data.

Table 3.2

Participant and Therapy Trial Partner Biographical Data

Variable	P1	p2	p3	p4	p5	p6	p7
Gender	Male	Male	Female	Female	Female	Male	Male
Age	45	56	42	67	52	62	54
Ethnicity	White British	White British	White British	White British	White British	White British	White British
First Language	English	English	English	English	English	English	English
Handedness	Right	Right	Right	Right	Right	Left	Right
Education	BTEC [a]	O Levels [b]	left at 16	left at 15	HND [c]	left at 17	Degree
Stroke	Left haemorrhage	LMCA[d] infarct	Left stroke	Left infarct	LMCA infarct	LMCA infarct	LMCA infarct
Time post stroke yr/mth	1:8	11:1	12:0	1:7	5:7	9:11	13:11
Occupation	Telephone engineer	Business owner	Cleaner	Cleaner	Business owner	Care Manager	Teacher
Severity Rating	1	1	1	2	2	2	3
p and ttp relationship	Father	Wife	Husband	Daughter	Husband	Wife	Partner
ttp age	60-70	50-60	40-50	30-40	50-60	50-60	50-60
ttp occupation	Retired manager	Business owner	unemployed unskilled worker	stable hand	Business owner	Personal assistant	unemployed unskilled worker
ttp ethnicity	White British	White British	White British	White British	White British	White British	White British

Note. [a]Business and Technology Council Award; [b]General Certificate of Education Ordinary Level; [c]Higher National Diploma; [d]Left middle cerebral artery; p = participant; ttp = therapy trial partner.

3.5 Materials

As discussed previously in this chapter, the three pre therapy assessments sessions served four functions. They allowed the identification of therapy and control words that would be used in the therapy trial. They formally assessed language and cognition that could be used as control tasks.

They were used to assess participants' single word language functioning and they were also used to conduct participant and ttp interviews. The type of materials used in this study and the justification for their use will be the focus of this upcoming materials subsection.

3.5.1 *Language and Cognitive Control Assessments*

Control measures are useful because they allow therapists and researchers to infer that any improvement that occurs in therapy is attributable to their intervention (Darley 1972; see also Howard, 1986; Kazdin, 1992; LaPointe, 1977; McNeil et al., 2011; Pring, 2004). The placebo effect (improvement because a person believes they are receiving intervention), the Hawthorn effect (improvement because a person is receiving intervention) and spontaneous recovery (improvement because the effect of a person's brain injury resolves over time) are three examples of the way in which attending any healthcare intervention may have an impact that cannot be attributed solely to the intervention itself. This premise will be discussed in more detail in 6.5.2 Different Possible Interpretations for the Positive Impact of Attending the Activation Therapy Trial.

In an attempt to differentiate between the impact of activation therapy and the impact of attending a healthcare setting, three control measures were used in this study, The Test for Reception of Grammar 2 (TROG2, Bishop, 2003), The Standard Progressive Matrices (Raven, 2006) and a set of comparable non therapy words. If attendance at a health-care event resulted in change, these measures should change in the same way as the therapy intervention outcomes. Conversely, if these measures remained static and the therapy outcomes showed change then the differential improvement might suggest that therapy was responsible for bringing about the alteration in function.

In this study, The Test for Reception of Grammar 2 (TROG2, Bishop, 2003) was used to assess participant understanding. TROG2 (Bishop, 2003) assesses grammatical language comprehension from simple two word element sentences through to complex sentences and assess understanding of relative clauses and post modified subjects. TROG 2 (Bishop, 2003) was chosen because it was a widely available, specific, exhaustive, reliable and valid measure of spoken sentence understanding. It was also chosen because spoken sentence comprehension did not improve as a by-product of twenty weeks of activation therapy in Bixley's (1998) activation therapy without word finding trial. This lack of improvement in spoken sentence comprehension after twenty weeks of activation therapy suggested that TROG 2 would be a suitable control measure for this project.

Dorothy Bishop kindly shared an electronic copy of an alternative parallel version of TROG2 so that it was possible to use two different versions of the Test for Reception of Grammar 2 (Bishop, 2003) to overcome any learning effects that might occur if participants were asked to complete the same assessment more than once. The parallel version assessed the same vocabulary and sentence structures as the original version but used different test stimuli. TROG 2 Version 2 (Bishop 2003) was used within the a2 assessment phase and TROG 2 (Bishop, 2003) was used within a1 and a3 assessment phases.

This study also used a test of cognitive functioning as a control measure. As with the TROG2 (Bishop, 2003), if this behaviour remained constant throughout the experiment, any change in language behaviour could be attributed to therapy rather than generalised improvement in brain function, for example improved attention or short term memory (Harnish & Lundine, 2015; Hula & McNeil, 2008) or the non-activation therapy specific benefits of attending a course of healthcare intervention. The cognitive control task needed to be of equivalent difficulty to the word finding assessments used in the therapy trial but it also had to be a skill that was unlikely to improve because of undergoing a course of activation therapy. In 1998 Bixley used two non-word reading tasks from the Psycholinguistic Assessment of Language Processing in Aphasia subtests 8 and 36 (Kay et al. 1992) as control measures. These assessments did not show any improvement over the course of the original study (Bixley, 1998) but because non word reading includes use of spoken output these assessments were not used in this therapy trial. This was because it is possible that successful activation therapy may have impact on access to spoken output and therefore non word reading tasks are not distinct enough to be used as control tasks for spoken word finding.

The Standard Progressive Matrices (Raven, 2006) were chosen as an exhaustive test of non-verbal reasoning and cognitive flexibility that was unlikely to improve because of participation in this activation therapy trial. It has to be acknowledged that commentators such as McNeil et al. (2011) and Hula and McNeil (2008) suggest that improved cognition may affect language processing and if activation therapy has an impact on skills such as attention and short term memory, these improved cognitive skills may impact positively on language processing. However, research by Basso et al., (1973) and Helm Estabrooks (2002), found no relationship between language the Standard Progressive Matrices (Raven, 2006) so this readily available assessment that Speech and Language Therapists can purchase and use in clinic without any training was designated the second control measure in this study.

The possible impact of improved language processing skills on the ability to perform The Standard Progressive Matrices (Raven, 2006) aside, a lack of change in The Standard Progressive Matrices (Raven, 2006) assessment with a corresponding improvement in spoken word finding could be used to infer the impact of successful word finding therapy but a change in both functions would not allow this inference to be made. Cognitive skills were assessed once at the beginning of the study and at the end of the trial within phase 3 assessment. It was not conducted in phase 2 because of the likelihood of participants remembering and learning the assessment with subsequent administrations.

After initial assessment participants were rated on The Assessment of Aphasia and Related Disorders Aphasia Severity Rating Scale (Goodglass & Kaplan, 1983 p28). The scale was used to provide a subjective rating of the aphasia and was also used to stratify the participants in this trial into severe aphasia and those with aphasia which was less severe. This has been discussed previously in section 3.3 research design. This scale was used by McVicker et al. (2009) to describe the participants in their recent research into the usefulness of their conversation partner scheme and despite its age, its interactional focus that makes it relevant to research today. The scale is presented in Table 3.1 Aphasia Severity Rating Scale. Participants were assessed on this scale at three points in the research project before therapy began, after their first phase of activation therapy and finally after they had completed the second phase of therapy.

3.5.2 *Single Word Processing Assessments*

Participants recruited to the study took part in a set of initial assessments that allowed a cognitive neuropsychological description of the problems that they encountered with single word processing, a differential diagnosis and a participant description. There is no accepted corpus of assessments that are used in all therapy research. However, most studies use current assessments such as such as the Western Aphasia Battery Revised (Kertesz, 2006), the Comprehensive Aphasia Test (Swinburn et al. 2004), The Psycholinguistic Assessments of Language Processing in Aphasia (Kay et al. 1992) and these assessments are routinely used in clinical practice (Bixley et al., 2011). These assessments are comprehensive and provide detailed analysis of a client's complete language functioning but in practice many clinicians only use parts of these assessments to arrive at a differential diagnosis.

Because of the wide-ranging nature of these assessments, many language skills are assessed using small sets of language within the different subtests and these subtests could not be considered exhaustive enough or representative enough to identify change in language function post therapy (Webster et al., 2013). For example, the PALPA (Kay et al., 1992) naming assessment contains 40 items and the CAT (Swinburn et al., 2004) contains 24 items to assess a client's ability to find words. It is clear that any research including statistical analysis, would require more evidence of word finding ability on which to base conclusions. There is also the confounding effect of the possibility of learning such a small set of words if these assessments were to be used repeatedly as outcome measures (Creet et al., 2019).

Another difficulty with creating a thorough and detailed cognitive neuropsychological evaluation is that clients have to participate in a variety of assessments. Recent research conducted by Hashimoto (2012) used sixteen assessments to describe before and after investigation of language functioning, whilst Wambaugh et al. (2013) used seventeen. Even when assessments were used as a way to describe baseline functioning, PWA have been asked to participate in a variety of assessments Morris and Franklin (2012) and Hickin et al. (2002) used fourteen and Lambon Ralph et al. (2000) used seventeen. It is not clear how many sessions were used to administer these baseline assessments but if one considers assessment a form of therapy, participating in so many assessments could affect language skills before therapy had even started. Excessive assessment could therefore be regarded as a factor that might influence the outcome of any language therapy trial.

In this current therapy trial participants took part in an initial assessment package that was exhaustive enough to identify targets for therapy and provide a cognitive neuropsychological single word processing diagnosis. As no current assessments fulfilled this need, assessments were created for this study using the 260 words in the Snodgrass and Vanderwart (1980) picture set. Snodgrass and Vanderwart (1980) published their open educational resource for use in language experiments and their set of 260 black and white drawings are accessible, clear, familiar and their use in recent research and current electronic data bases attests to their ongoing relevance to aphasia word finding research (Hashimoto, 2012; Kay et al. 1992; Szekely et al. 2004; Van Hees et al. 2013). The complete word list of all 260 pictures is presented in Appendix 6.

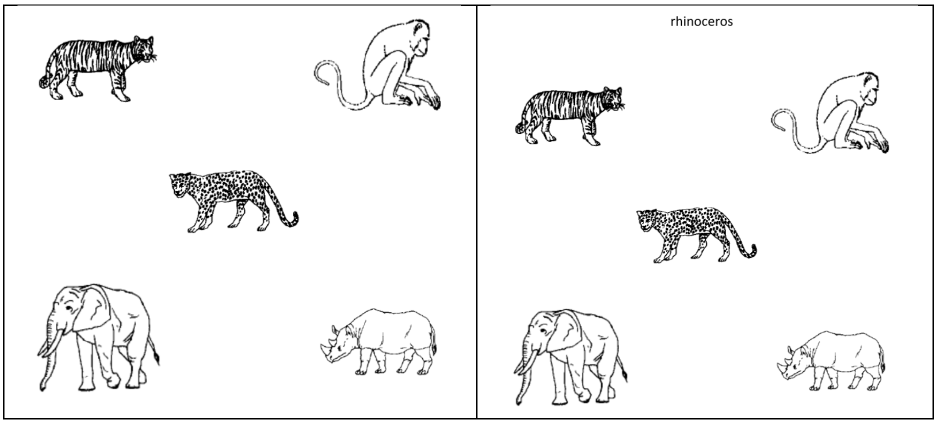
The Snodgrass and Vanderwart (1980) 260 pictures were used to create seven 260 single word processing assessments. The assessments tested single word understanding (1), repeating single words (2), reading single words (3), writing single words (4), and three spoken word finding assessments (5, 6, & 7). These assessment results were combined to identify why participants had difficulty finding words. For example, if they could understand words they could not say, or repeat or write words they could not say. Using the same vocabulary to arrive at a diagnosis by comparing different modalities is a common practice in aphasia assessment (Goodglass & Kaplan, 1983; Hillis 1989; Kay et al. 1992) but the innovation in this project is that comparative assessment included so many words and that the words used to assess each modality were the same. Appendices 7 -11 present copies of the score sheets and a sample page of each of the assessments used to evaluate participants' ability to understand spoken single words (Appendix 8), read single words (Appendix 9), repeat single words (Appendix 11), write single words (Appendix 10) and say words (Appendix 7).

Individual assessments used the vocabulary in a random order to prevent the same items appearing at the beginning of the assessments and being less likely to be affected by fatigue (Appelros et al., 2006) than items that appeared later in the assessments. Spoken and written understanding was assessed by asking participants to point to a picture that matched either a spoken or written word. The target word was presented in a randomly arranged array of five pictures, the target and four distractors. All distractor pictures were part of the Snodgrass and Vanderwart (1980) 260 picture set and assessments were designed to control for the number of times each item was used as a distractor and assessments were designed to ensure, as closely as possible, that pictures were used as distractors the same amount of times as each other and example of this kind of array is presented in Figure 3.4 Spoken Word to Picture Matching Score Sheet and a Written Word to Picture Matching Score Sheet for the Target Item Rhinoceros.

LaPointe (1977) suggested that three assessments of baseline spoken word finding performance were required to guard against variability that might be caused from natural fluctuations in word finding skills and so participants in this study took part in three Snodgrass and Vanderwart (1980) 260 word finding assessments to ensure that word finding baselines represented an intractable word finding problem. Each of the three word finding assessments used all of the 260 words but in a different order to mitigate against an order affecting the success of word finding at different stages in the assessments (Perreault, 1975) and to prevent the alphabetical cueing that might happen if one word starting with b cued the next picture in the picture set starting with b (Levelt et al.1999). Unfortunately, random allocation does not mitigate against the impact of priming through meaning and it has to be acknowledged that this type of priming may have affected the word finding skills, both positively (Dell & O’Seaghdha 1991) or negatively (Forde & Humphreys, 1997, 2007).

Figure 3.4

Spoken Word to Picture Matching Score Sheet and a Written Word to Picture Matching Score Sheet for the Target Item Rhinoceros



3.6 Therapy Experience Interviews

Interviews were conducted in each assessment phase and both participants with aphasia and their ttps were interviewed at the beginning of the trial, after the first therapy and after therapy had stopped. Interviews questions were designed to elicit participant and ttp views about living with aphasia and the questions were relatively unstructured. Participant interviews typically lasted an average of 24 minutes and ttp interviews lasted an average of 14 minutes. Interviews were recorded using a Panasonic Camcorder and a San Disc Memory Card and at the end of each interview the recording was transferred onto two external hard drives, one main drive and a back-up.

The rationale underpinning the design of the interview schedule was based on the qualitative research principle that information should be induced and generated within interviews rather than precede the interview (Glaser & Strauss, 2008; Strauss & Corbin 1998; Cutcliffe, 2000; Skeat & Perry, 2008) by creating interviews which are based on a predetermined set of topic focussed questions. The ten question interview schedule is presented below and was tailored to either the participant or the ttp

1. *Tell me about x's experience of working with Speech and Language Therapists?*
2. *How would you describe Speech and Language Therapy?*

3. *What did x think about therapy?*
4. *What is important to x?*
5. *What does the future hold for x?*
6. *Before this research project what was life like?*
7. *What is life like now?*
8. *How do you see x now?*
9. *Can you describe x?*
10. *What do you think life will be like in the future?*

3.7 Procedure

After participants and their ttps had given informed consent to take part in the study and completed the initial assessment phase therapy they were rated on the Goodglass and Kaplan (1983) aphasia severity rating scale. Three participants were graded as presenting with severe aphasia, p1, p2, and p3 and these volunteers were randomly allocated to one of the two therapy pathways. The other four participants who presented with less severe aphasia were also randomly allocated to one of the two therapy pathways. The only difference between these pathways was the order in which participants received the two different types of activation therapy. The two pathways are presented in Figure 3.3. Graphical Representation of the Stratified and Randomly Allocated Repeated Measures Counterbalanced Crossover Therapy Trial Design.

All but a handful of assessment and therapy sessions took place in the same university meeting room. In the first three assessment sessions participants took part in, the three Snodgrass and Vanderwart (1980) 260 spoken word finding assessments, the four Snodgrass and Vanderwart (1980) 260 single word processing assessments (spoken word to picture matching, written word to picture matching, written word finding and word repetition), the two control assessments (Test for the Reception of Grammar 2, Bishop, 2003; The Standard Progressive Matrices, Raven, 2006) and an aphasia therapy experience interview. ttps were also interviewed using the same semi structured non directive interview schedule. Participants and ttps were interviewed separately. Harder assessments, such as the spoken word finding assessments, were conducted in sessions that also contained assessments that were less challenging, such as the comprehension word finding assessments. This was to ensure that participants did not leave assessment sessions feeling that they had not succeeded.

3.7.1 *Activation Therapy With and Without Word Finding*

Participants were then provided with one of the two types of activation therapy in six therapy sessions. This provision was based on clinical benchmarks and focus group feedback. A focus group of PWA suggested that once a week community based aphasia therapy would be an ideal amount of therapy. They suggested that it would not be too disruptive to their lives and it would be an amount they could commit to. Six weeks of each type of therapy was provided because in the United States insurance companies insure people six sessions of SLT (Clinton, 2003) and in Britain the Early Supported Discharge teams provide six weeks of support to those who are discharged home from hospital after a stroke (Care Quality Commission, 2011). This limited amount of therapy is relatively unusual in aphasia research but important if the results of this study are to be translated into clinical practice. For example, participants in Sickert et al. (2014) constraint induced aphasia therapy randomised clinical trial received 30 hours of therapy and this was provided in addition to extensive language assessment before the trial began.

Activation therapy sessions lasted one to one half hours. At the beginning of therapy sessions participants were provided with an explanation of the theory underpinning activation therapy and why it might improve their word finding skills. Graphic representations were used to help participants conceptualise how stroke affected language skills and how working on accessing meaning and thinking about the difference between similar items helped word accessing. Participants were reminded that aphasia did not mean incompetence but just a problem with using language to demonstrate their competence. They were also reminded about the aim of the research which was to compare the impact of the two types of activation therapy to see if one of them worked better than the other. Therapy record sheets showing pictures that were used to present these concepts at the beginning of every session are presented in Appendix 3 Therapy Record Sheet. The record sheets were also used to record the words targeted in therapy, provided a prompt for descriptions and recorded the success of word finding practice.

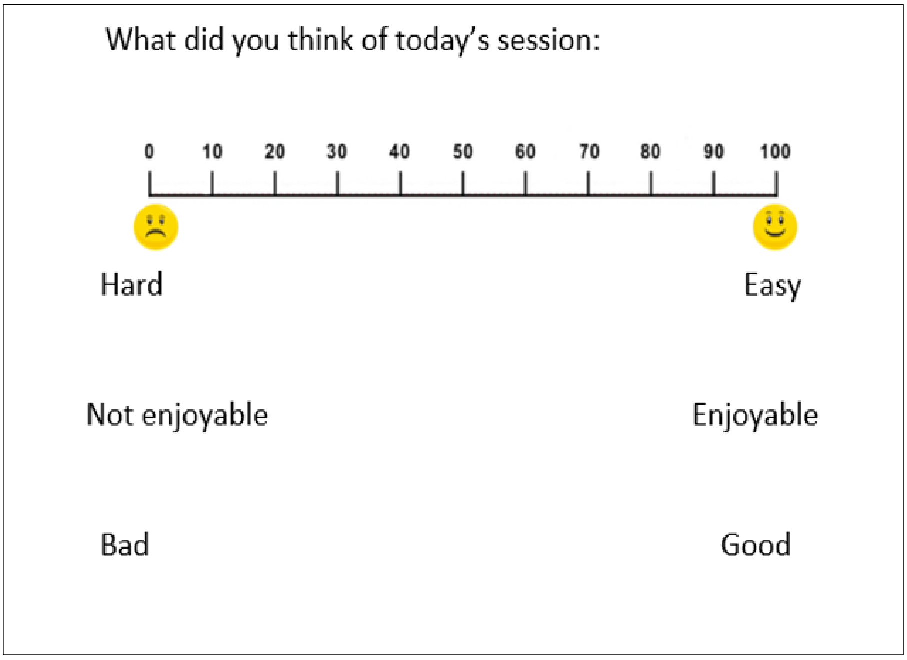
During the main part of the session participants were asked to listen to descriptions based on each of the therapy words allocated to either activation therapy with word finding or activation therapy without word finding. The descriptions lasted for approximately two minutes and included at least eight pieces of information about each of the words targeted in therapy. Kogan (1975, as cited in Maruszewski, 1975) and Rinnert and Whittaker (1973) described the ways in which concepts could be associated or disassociated with each other. These lists appear almost definitive and were used to base the word description list that was used to prompt word descriptions. The prompt list included name, function, most salient feature, location, category membership, co-ordinates, synonyms, antonyms, subtypes, parts of, idiosyncratic associations, collocations, and sentence completion. The addition of idiosyncratic associations allowed therapy to be tailored to individual clients who may have a salient memory about the words targeted in therapy. See 2.7 Activation Therapy for an example of the description of the target word gorilla. In a previous study Bixley (1998) noted that the descriptions changed over the course of therapy. Speed, depth and abstractness of the detail provided in the descriptions increased over time.

After listening to each two minute description participants were asked to point to the picture associated with the prompt list they had just heard. Target pictures were presented within an array of four other words that were closely associated to the therapy word. These arrays were the same arrays that had been used in the spoken word to picture matching assessments. This part of the therapy procedure was used to check that the participants could identify the word that had just been described. Therapy word sets were re organised between each session to mitigate against any order effect and optimise engagement.

If participants were being provided with activation therapy with spoken word finding they were asked to say the word that matched picture. The therapist provided a sequence of graded cues to stimulate the participant to say the word. This graded cueing consisted of a tell me what the name of this picture is prompt, sentence completion prompt, a first sound prompt, an extended sound prompt, and lastly the participant was asked to repeat the word. Participants who could say the word by themselves practised the word eleven times. Participants who could not say the word were helped to access as much of the word as they could and practised this output eleven times. In the activation therapy without word finding sessions participants did not speak at all. They listened to descriptions and pointed to the target word that was presented to them within an array of four other similar pictures. This lack of word finding practice was the only difference between the two activation therapy sessions. At the end of both types of therapy participants were asked to give feedback on the session by completing three visual analogue scales which are presented in Figure 3.5 Visual Analogue Feedback Scales and on the last page of Appendix 3 Therapy Record Sheet. Apart from completing this scale all other conversation was social, no other types of therapeutic intervention were offered during these sessions.

Figure 3.5

Visual Analogue Feedback Scales



3.7.2 *a2 and a3 Assessments*

Following the first six therapy sessions, participants took part in three a2 assessment sessions. One of the three Snodgrass and Vanderwart (1980) 260 spoken word finding assessments was conducted each week. Participant and ttp interviews were also conducted in the a2 assessment phase, as was The Test for the Reception of Grammar 2 Parallel Version (Bishop, 2003). Participants were then provided with six weeks of the alternate type of activation therapy.

a3 assessments followed the second phase of therapy. Once again, assessments included the three Snodgrass and Vanderwart (1980) 260 spoken word finding assessments which were conducted weekly. Participants and ttps also took part in therapy experience interviews and re administration of the control assessments, the Test for the Reception of Grammar 2 (Bishop, 2003), and The Standard Progressive Matrices (Raven, 2006). The Aphasia Severity Rating Scale (Goodglass & Kaplan, 1983 p. 28) was also rescored at a2 and at the end of therapy in the final a3 assessment phase.

3.8 Research Methodology Summary

This study was designed to investigate the impact of activation therapy with and without word finding. Its seven participants and their ttps took part in a stratified and randomly allocated three times repeated word finding measure, two activation therapy technique counterbalanced crossover therapy trial. The impact of activation therapy was measured using three complementary methods, word finding assessments (Snodgrass and Vanderwart, 1980), grammatical analysis (Crystal, 1982) and thematic analysis (Braun and Clarke2006). The methodology chapter provided a description of the participants, the materials, and the procedure which were common to all methods. It explained how a1 assessments were conducted to assess single word processing at baseline, conduct control task measurement and also to conduct therapy experience interviews with participants and their ttps. The methodology also described how a2 and a3 assessment phases were used to evaluate the impact of activation using therapy experience interviews, word finding re-assessments and control assessments after the first episode of activation therapy, in the a2 phase and after the therapy trial had finished, in the a3 phase. Because the research design includes three complementary but disparate research methods, Chapters 4, 5 and 6 have been constructed to present each method individually and to highlight how each method can contribute to understanding the impact of activation therapy with and without word finding. Each chapter will present information relevant to the theoretical underpinnings, the findings and the discussion related to each method separately. Chapter 4 will present word finding assessments, Chapter 5 will present grammatical analysis and Chapter 6 will present thematic analysis and Chapter 7 will present a general discussion about topics that are relevant to all methods. Finally, Chapter 8 will conclude this dissertation by summarising its key findings, limitations and recommendations for future enquiry.

Chapter 4 Word Finding Assessment Results

4.1 Introduction to the Three Results Chapters

Having outlined the methodology used in this clinical trial, the ensuing chapters will focus on each type of method used to evaluate the impact of activation therapy. It will provide details about each methodology, present the findings and each chapter will conclude with a discussion. This study used different methods to evaluate the benefits of activation therapy, because as discussed previously in 3.2 Mixed Methods, Plano Clarke and Creswell (2008) suggested, different research methods are able to assess the possible benefits of an intervention from different perspectives. Many investigators have addressed the effect of aphasia therapy on word finding impairments, see 2.4.6 Phonological Therapy and 2.4.7 Semantic Therapy. Others have looked at the effects of therapy on the person living with aphasia, see 2.2.4. Impact on the Person, Their Activity and Participation. Fewer investigators, for example, Greenwood et al. (2010) have looked at an impairment based intervention for aphasia and evaluated it from more than one perspective. The use of three measures to investigate the benefits of aphasia therapy has been used rarely despite aphasia researchers such as Linnik et al. (2016), Best et al. (2008) and Edwards (1987) promoting the need to evaluate aphasia therapy beyond the impact of therapy on the word finding impairment alone.

Results Chapters 4, 5, and 6 address the four aims and objectives of this research project, see 2.8 Research Rationale and Research Questions. Chapter 4 presents the evaluation of the impact of activation therapy on word finding difficulties. Word finding assessment results (Snodgrass & Vanderwart, 1980) from three assessment phases were compared to evaluate whether the two different types of activation therapy, activation therapy with word finding and activation therapy without word finding, had the same or a different impact on participants' word finding skills (aim 1). They were also used to investigate the extent to which both types of activation therapy had a positive impact on word finding in word finding assessments (aim 2).

Chapter 6 presents the evaluation of the impact of activation therapy on the ability to use words phrases and sentences in therapy experience interviews. This chapter addressed the third aim of the study and used Crystal's (1982) grammatical analysis framework to investigate and compare word finding, phrase level and clause level production at all three assessment points. Finally, in chapter 6, qualitative therapy experience interviews which were conducted pre therapy, midway through therapy and after activation therapy were analysed using Braun and Clarke's (2006) thematic analysis. This method was used to evaluate the experience of participating in the activation therapy trial addressed the final aim of the research project, research aim 4. At the end of chapter 6 findings from all three methods will be triangulated and integrated to investigate the way in which the findings could be combined to provide a deeper insight into the impact of activation therapy with and without word finding.

At a time in which researchers acknowledge the importance of looking at the way in which therapy affects the PWA beyond the assessment of the skill addressed in therapy, this research will add to the aphasia therapy evidence base. At best it will demonstrate that activation therapy works at different levels (Webster et al., 2015) and at worst it will demonstrate that providing activation therapy for the people in this trial was not worth the time effort and expense involved. Either way, this novel approach to aphasia therapy and the mixed methods analysis of the benefits of therapy will add to the evidence base for or against providing activation therapy for people with aphasia.

4.2 Initial Single Word Processing Assessments

4.2.1 Initial Single Word Processing Word Finding Assessment Procedure

Data were gathered at three points in the therapy trial; a1 (before therapy began), a2 (midway through the therapy trial, and a3 (at the end of the therapy trial). In the initial assessment phase all seven participants were asked to complete a range of single word assessments that would result in a description of their word finding difficulties. In order to do this, participants were asked to take part in 5 types of Snodgrass and Vanderwart (1980) 260 single word processing assessments. Spoken word understanding (1), written word understanding (2), repeating words (3), writing single words (4) and finally spoken word finding assessments (5). The five types of assessment were conducted using the same Snodgrass and Vanderwart (1980) 260 vocabulary set, see Appendix 6 Word List for the Snodgrass and Vanderwart (1980) 260 picture set. The data obtained from these five types of assessment allowed the direct comparison between word accessing in different modalities and a comparison between the ability to understand and express a word.

In the three Snodgrass and Vanderwart (260) Spoken Word Finding Assessments, participants were presented with a picture and asked to find the word that described it. All spoken word finding assessments were coded live and transcribed at the time of assessment. Participants who were unable to find any words at all were not asked to struggle and attempt to find a word for each item but they were encouraged to look at each picture in case they were able to find the matching word easily. All assessments sessions were recorded using a Panasonic Camcorder and a San Disc Memory Card. At the end of each session the recording was transferred onto two external terabyte hard drives: one main drive and one back up. Recordings of spoken word finding assessments were then used to review and check codes assigned to each word used in the three initial a1 Snodgrass and Vanderwart (1980) 260 word finding assessments.

The codes that were used to describe the data were: yes, delay, sound difference (also called phonological or literal), meaning difference (also called semantic or verbal), unable, English word and sound sequence (also called neologistic distortion). Delays were coded when participants were unable to name the word spontaneously and there was a pause between seeing the picture and finding a word. This delay was evident in visible, auditory or gestural searching behaviours that signalled a difficulty in accessing a word. The term difference was chosen for two reasons. The first because the term difference labels the target behaviour and does not suggest a level of processing breakdown. The difficulty with identifying processing breakdown from surface language has been discussed previously in 2.4.9 Model Appropriate Therapy. The second reason for choosing this term is that it is not pejorative and implicitly acknowledges that communication is the result of the functioning brain rather than the damaged brain, see 2.7 Activation Therapy for a fuller discussion of this proposition.

Some words in the Snodgrass and Vanderwart (1980) picture naming assessment have plausible alternatives. For example, some words have accepted short forms (telephone and television), some items use the American form of a word (pocket book for handbag) and some words have acceptable synonyms (sofa and couch). In this investigation, in these circumstances, alternatives were coded as successful word finding. After the online coding had been checked, coded data were then transferred onto excel spreadsheets for analysis and selection of words that would be used in the therapy trial, see 4.2.3 Identifying Relevant Therapy Words from Word Finding Assessments.

In this therapy trial, within each assessment phase, spoken word finding assessments were conducted not once but three times. This was because spoken single word processing skills are the focus of activation therapy with and without word finding and LaPointe (1977) suggested that a minimum of three baseline assessments were required to infer that a baseline was stable. Three assessments are also required to try and exclude the possibility of word finding skills measurements reflecting random variation in naming skills that Nickels (2002) suggested, was typical for PWA. Another rationale underpinning the administration of three assessments was to ensure that participants presented with an intractable word finding problem that would not improve without intervention. Nickels (2002) highlighted a problem that had been evident in many word finding therapy trials such as the work conducted by Howard et al. (1985c). This is the premise that practice makes perfect and offering PWA the opportunity to practise word finding during assessment may be all that is needed to facilitate improvements in word finding skills, in other words, assessment is all the therapy that is required (Creet et al., 2019).

4.2.2 ***Initial Single Word Processing Results***

The Initial language processing assessment package was conducted to identify a cognitive neuropsychological differential diagnosis for each participant. This was considered necessary to understand how, if successful, activation therapy affected each of the seven participants in this study. By comparing the results of all of the Snodgrass and Vanderwart (1980) assessments it would be possible to identify why they had difficulty finding the words used in the assessments (see 3.5.2 Single Word Processing Assessments). It would also be possible to predict whether or not activation therapy was being provided in a model appropriate way or whether theory would suggest activation therapy would have no effect on individual participants' word finding skills (see 2.4.9 Model Appropriate Therapy).

All seven participants could understand words they could not say. Understanding scores ranged from 170/260 to 260/260 whilst spoken word finding scores ranged from 2.33/260 to 155/260. These scores suggested that participants had more difficulty producing words and had less difficulty understanding them. Six out of seven participants could write words more successfully than they could say them. However, all participants had difficulty with written word finding but to very different degrees. Scores ranged from 4/260 to 231/260. These scores suggest that the word finding difficulties experienced by the seven participants in this trial were common to both output modalities and not just restricted to spoken word finding. Hillis (1989) suggests that PWA who experience difficulties in both output modalities are experiencing difficulty accessing meaning and does not reflect a difficulty with one modality in particular. This way of differentially diagnosing participants in this therapy trial is a stricter criterion than that which has been used in other therapy trials that have relied on comparisons within therapy trial groups to identify people with more or less meaning difficulties (Howard et al. 2006; Best et al. 2013), however it is pertinent to this study which, for activation therapy without word finding, was designed to work primarily at the level of accessing meaning.

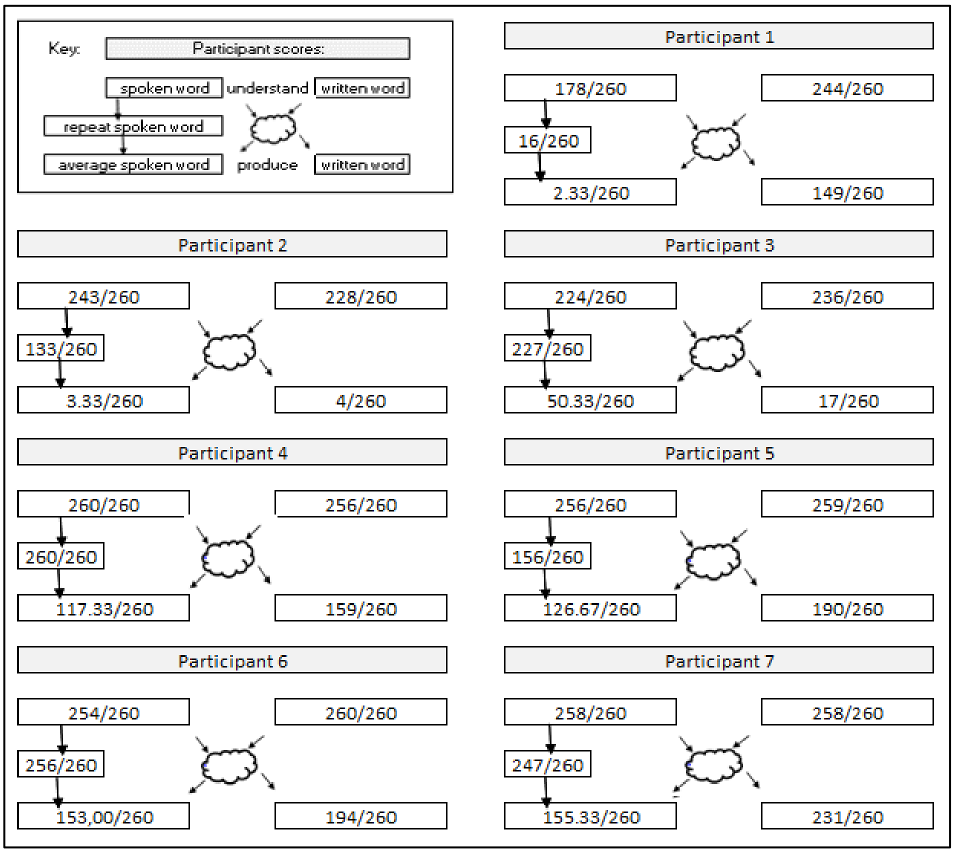
p1's comprehension of single words was the most affected by aphasia. He was able to understand 178 words. However, he was able to write 147 words he could not say. This score suggests his spoken output may have been affected by apraxia of speech (Ballard, 2015; Miller, 2015) because his spoken word finding was significantly different to his ability to understand and write words. Whether or not he was experiencing aphasia combined with an apraxia of speech and aphasia, his comprehension, spoken and written output difficulties attest to the presence of aphasia and therefore p1 might be expected to respond to a period of aphasia therapy, albeit less dramatically than the other six participants whose response to activation therapy would not be complicated by such a severe apraxia of speech.

All participants apart from p1 could repeat words they could not say. P3, p4, p6 and p7's repetition skills were relatively spared and their repetition scores ranged from 227/260 to 260/260. Relatively intact repetition scores suggest that the final process in sound output processing, what Patterson and Shewell (1987) referred to as response buffer processing is intact. This is because repetition involves the phonological analysis of incoming sounds and the immediate conversion of this analysis to phonological encoding for speech output. We know that this process can happen without understanding because we can repeat words we do not know and words which have been made up. The importance of relatively intact repetition skills is that they signal that phonological analysis and phonological encoding are still working in people with aphasia. Their difficulty with word finding results from a problem elsewhere in the system. Individual single word processing models based on the Patterson and Shewell (1987) model of single word processing are presented in Figure 4.1 Participants' Single Word Processing Summaries Presented as Seven Single Word Processing Models and show how each individual's language skills had been affected by their stroke. This way of presenting the result of single word processing assessments has not been used before but it has been designed to allow the reader to compare input and output abilities, spoken and written abilities, repetition abilities of each individual participant.

These results suggest that the seven participants with aphasia all had different degrees of single word processing difficulties. All participants showed some difficulties with accessing spoken and written words which suggests that activation therapy may improve comprehension (Fleming et al., 2021) which would then have an impact on subsequent word accessing (Howard et al, 2006). All participants had problems with written and spoken output which also suggests that they would benefit from activation therapy (Hillis, 1989) that would boost the integrity of the underlying representation to provide additional impetus to cross the meaning word form rift (Howard et al., 2006; Lambon Ralph et al., 2000; Levelt et al, 1999). None of the participants presented with a single modality output problem which suggests that the problem with word finding was not primarily item specific.

Figure 4.1

Participants' Single Word Processing Summaries Presented as Seven Single Word Processing Models



4.2.3 Identifying Relevant Therapy Words from Word Finding Assessments

One of the seventeen criteria Tate et al. (2008) considered for inclusion in their Single Case Experimental Design Scale checklist was the relevance of baseline measures to the target behaviour (Tate et al., 2008 p. 388). In this study, initial assessments not only allowed a clinical description of the way that aphasia had affected each individual's single word processing skills, they also allowed the identification and selection of therapy items. Therapy trial stimuli, for each participant, were selected on the basis of their ability to find words in the initial assessments. Each participant's therapy trial word sets were selected from the corpus of words which participants had experienced difficulty accessing in the three initial Snodgrass and Vanderwart (1980) 260 word finding assessments, see 4.2.1 Single Word Processing Initial Word Finding Assessments Procedure.

This criterion has been adopted in trials conducted by Conroy et al. (2009) and Nettleton and Lesser (1991). For participants such as p1, who had severe aphasia, this was an easy task. For participants such as p7 this was a more difficult task because his word finding skills were less impaired and they were variable in that his ability to find words successfully was inconsistent. In some assessments he was able to access a word and in another he encountered difficulties finding the same word he had been able to find in previous assessments. For participants like p7, words that were problematic in two out of three assessments were counted as word finding difficulties and were part of the pool from which therapy trial stimuli were drawn. This criterion has been used in therapy trials conducted by Best et al. (2013), Rose and Douglas (2008), and Patterson et al. (1983).

Three equal sets of therapy trial words were needed for each participant. A set of words that would be used as therapy words during the first six weeks of activation therapy, another set of words that would be used during the second six weeks of activation therapy and lastly a set of words that would not be used in therapy at all. This last set of words was to be used as a control set of no therapy words from which the benefit of activation therapy with and without word finding would be inferred, if words which were not treated showed no or less improvement than words that had been treated in either of the therapy sets. In this therapy trial, the same set of words was used as the control for both phases of activation therapy and the rationale for this decision will be discussed in detail in 4.4 Measuring Word Finding Skills.

p1, p2, p3 and p5 were all allocated 3 sets of 30 matched stimuli. Because of human error, p4 was allocated 31 items in each set rather than 30. Only 24 items for p6 and 21 items for p7 met with the therapy trial word finding inclusion criteria that participants should have encountered word finding difficulties in 2/3 of a1 naming assessments. This reduction in the number of therapy targets was considered acceptable and a factor that could be accommodated in the final analysis of the data. It meant that rather than analysing raw data, scores were translated into the corresponding percentage of the data set. This compromise was a pragmatic solution to unequal participant therapy sets. Table 4.1 The Number of Words Allocated to One of the Three Therapy Trial Word Finding Sets for Each of the Seven Participants summarises the number of items that were matched and allocated to either the activation with therapy pathway, the activation without word finding therapy pathway or the control set pathway.

Table 4.1

The Number of Words Allocated to One of the Three Therapy Trial Word Finding Sets for Each of the Seven Participants

participant		p1	p2	p3	p4	p5	p6	p7
pathway 1	atherapy with words	30			31			21
	atherapy without words	30			31			21
	control words	30	30	30	31	30	24	21
pathway 2	atherapy with words		30	30		30	24	
	atherapy without words		30	30		30	24	
	total words	90	90	90	93	90	72	61

Therapy and control word were matched as carefully as possible to ensure that factors thought to make word finding easier or harder were accounted for at the beginning of the trial (Funnell & Sheridan, 1992). This was so that any changes in word finding skills after therapy could not be attributed to factors such as differences between: category membership (Mahon & Caramazza, 2009; Warrington & McCarthy, 1983), syllable structure (Howard et al., 1995), familiarity and visual complexity (Snodgrass & Vanderwart, 1980) and word frequency (Funnell & Sheridan, 1995). Appendix 3 Tables 1-7 show the three sets of words for each participant. Category membership, the category that a word belongs to, also influenced how words were assigned because one of the predicted benefits of activation therapy is generalisation. That is, words that are closely related to therapy words may also improve with activation therapy (Boyle & Coelho, 1995; Collins & Loftus, 1975; Kiran &Thompson, 2003). Each set of words contained the same number of categories so that the impact of within category generalisation could be assessed.

In the original Snodgrass and Vanderwart (1980) 260 picture set research, the authors proposed that there were sixteen categories within their pictures; however, the International Picture Naming Project Database (Szekely et al., 2004) sorted the same set of pictures into nine categories. This different view of the similarities between objects suggests that category membership is not absolute and depends on the person allocating concepts to membership groups.

For this project thirty one different categories were identified within the data set, these were: birds, body parts, buildings, carrying things, cleaning things, clothing, crockery, cutlery, food, footwear, fruits, furniture, garden, headwear, household appliances, housework tools, insects, kitchen things, land animals, musical instruments, office supplies, personal effects, sea creatures, self-care, sewing, sky, smoking, sports, things children play with, tools and DIY, vegetables, vehicles and weapons. Twenty three pictures did not fit into any category and some items showed some degree of crossover, for example, scissors, but with these anomalies recognised and taken-into account, this investigation the words in each individual participant's stimuli sets were derived from the same number of different categories.

4.3 Single Word Processing a1, a2 and a3 Procedure

At the end of the initial assessment phase participants were stratified. Moffet (1991) and Beeson and Robey (2006) suggested that stratification could be used to exclude the possibility of people with the same influencing characteristic being allocated to the same group randomly and the results being affected by a selection bias (Brady et al., 2016). In this trial, stratification was used to avoid the severity of aphasia complicating the results of the clinical trial (Beeson and Robey, 2006; Brady et al., 2016; CASP, 2020; Moffett, 1991). p1, p2 and p3 were stratified into the severe aphasia group and p4, p5, p6 and p7 in into the group that were able to find words more easily.

Following stratification, participants were randomly allocated to one of the two therapy pathways outlined in Table 4.2 The Stratified and Randomly Allocated Repeated Measures Counterbalanced Crossover Therapy Trial Design. p1, p4 and p7 were allocated to pathway 1 and received six weeks of activation therapy with word finding practice before receiving a further six weeks of activation therapy without word finding practice. Conversely, p2, p3, p5 and p6 were allocated to pathway 2 and received six weeks of activation therapy without practising word finding first, followed by six weeks of activation therapy in which they practised word finding. Assessment periods lasted 3 weeks and periods of therapy each lasted 6 weeks

Table 4.2

The Stratified and Randomly Allocated Repeated Measures Counterbalanced Crossover Therapy Trial Design

participant		p1	p2	p3	p4	p5	p6	p7	a1	therapy 1	a2	therapy 2	a3
pathway 1	atherapy with words	30			31			21	baseline	atherapy with	outcome		
	atherapy without words	30			31			21			baseline	atherapy without	outcome
	control words	30	30	30	31	30	24	21	phase one baseline		phase 1 outcome phase 2 baseline		phase two outcome
pathway 2	atherapy with words		30	30		30	24				baseline	atherapy with	outcome
	atherapy without words		30	30		30	24		baseline	atherapy without	outcome		
	total words	90	90	90	93	90	72	61					

The seven participants in this crossover therapy trial (Mills et al., 2009) each participated in nine word finding assessments. The same three Snodgrass and Vanderwart (1980) word finding assessments, Snodgrass and Vanderwart (S&V) word finding 1, S&V word finding 2 and S&V3 word finding 3 were conducted before therapy began a1, after participating in the first phase of activation therapy a2 and after completing the second phase of activation therapy (see Appendix 7 Word Lists for the Snodgrass and Vanderwart (1980) Three Word Finding Assessments). During all assessments word finding responses were coded and transcribed using broad phonetic transcription where appropriate. Successful word finding was coded as yes. If participants were unable to find the word without difficulty their responses were coded as either delay, sound difference, meaning difference, unable, English word and sound sequence. Delays were coded when participants were unable to name the word spontaneously and there was a pause between seeing the picture and finding a word and if visible, auditory or gestural searching behaviours signalled a difficulty in accessing a word.

All but one of the 63 assessments recorded successfully. Recordings allowed online coding to be reviewed and verified and allowed codes to be reviewed for intra-rater reliability measurement (see 4.12 Procedures used to Reduce the Possible Impact of Bias - Word Finding Assessments)**.** p4's third Snodgrass and Vanderwart (1980) 260 word finding assessment in the a2 phase did not record. This meant that the online transcription of p4's a2 Snodgrass and Vanderwart (1980) word finding assessment was the only source data for this assessment and its coding could not be reviewed.

4.4 Measuring Word Finding Skills

There are problems associated with making calculations in a group crossover therapy design such as this. The first challenge is that the number of words in different participants' therapy trial word finding sets varied, for example p1 practised 30 therapy words and p7 had 21. This difference in therapy sets means that p7 had less opportunity to demonstrate the impact of therapy on his three sets of 21 items and p3 had more opportunity with her three therapy sets which included 30 items each. Best et al. (2013) encountered this problem when they reported their case series study into the impact of anomia therapy and needed to compare data sets of 200 words (16 participants) with data sets of 120 words (2 participants). They overcame this difficulty by comparing each participant's proportion of "correct" items rather than the actual number of words that participants were able to access (Best et al., 2013 p. appendix 5). This convention was adopted in this present study and raw scores were converted to a proportional score of 30 (p1, p2, p3, p5), 31 (p4), 24 (p6) or 21 (p7) words so that scores derived from different participants could be compared.

A second challenge to identifying the impact of therapy is that, word finding variability (Nickels, 2002), word finding practise (Bixley, 1998; Nickels, 2002) and regression to the mean (Barnett et al., 2004) can all affect measuring word finding outcomes. LaPointe (1977) suggested that conducting three assessments could identify if a measurement was relatively stable and Beeson and Robey (2006) concurred with LaPointe (1977) and suggested that measurement over three occasions is a better estimate of function than one measurement alone. In this clinical trial participants took part in three word finding assessments in each assessment phase. Snodgrass and Vanderwart (1980) 260 1, 2 and 3 word finding assessments. Scores within each assessment phase were averaged into a single average score and these average scores were used as the raw scores for the analyses comparing words allocated to each therapy condition, the control condition and the impact of therapy on overall word finding skills.

Another problem inherent in measuring change in this type of clinical trial is the impact of the first therapy, This first therapy may have an impact only on the words targeted in the first therapy phase and also words that had been allocated to the second therapy set and the control set of words. This improvement could be referred to as generalisation and as Behrmann and Byng (1992), Best et al (2013) and Webster et al. (2015) suggest, it is a desirable outcome of impairment-based word finding therapy. If the baselines for the second phase of therapy are not adjusted to account for any possible improvement brought about by generalisation within the first therapy phase there is a risk of a type 2 error (Huitema, 2011) because the potential to improve in the second phase of the trial may be less than the potential to improve in the first phase of the trial.

To overcome the impact of possible and desirable generalisation Lambon Ralph et al. (2010 p. 294) used the maximal gain calculation which included any possible gains that happened as a result of generalisation in phase one by re-setting the baseline in phase two to include these phase one gains. In the present therapy trial, analysis of improvement was based on the maximal gain numerical improvement from assessment to assessment rather than improvement from initial assessment scores. This convention was adopted for the analysis of the two therapy word sets and the single control word set in this clinical trial and used the following calculation *(post therapy naming accuracy – baseline naming) / (number of items included in therapy – baseline naming,* Lambon Ralph et al., 2010 p. 294*)*

4.5 Multiple Statistical Analyses

When studies use more than one statistical analyses on a data set, it has been suggested that there is more likelihood of finding a significant difference by chance, this has been referred to as a type 1 error in which the null hypothesis is rejected incorrectly (Cabin & Mitchell, 2000). With a significance level of $P<0.05$, the null hypothesis would be rejected by chance in one in twenty analyses and the likelihood of a Type 1 error increases with every additional test conducted on the same set of data. For example, if twenty comparisons were conducted on a set of data the possibility of one test revealing a significant difference by chance raises to $P<0.64$ (Perneger, 1998).

The Bonferroni correction (Cabin & Mitchell, 2000; VanderWeele & Mathur, 2019) is used to adjust the level of statistical significance to accommodate the number of statistical analyses performed on the same data set and can be calculated using the standard Bonferroni equation (significance level /number of statistical tests conducted on the data set, Nakagawa, 2004). This formula means irrespective of the number of tests used on a set, overall probability remains at $P<0.05$. So, if twenty tests were conducted on one set of data, the significance level for each test would be set at $P<0.0025$; a very strict significance level for individual tests but an acceptable overall significance level that adjusts for the increased probability of incorrectly identifying a significant difference when using multiple tests on one set of data.

There are some key difficulties with using a Bonferroni adjustment. The most notable is that the Bonferroni correction increases the likelihood of not identifying a significant difference in a data set. It increases the probability of a Type 2 error because the significance level is too stringent. This possibility has consequences, it means that researchers may choose to not present non-significant results and a valuable source of evidence is lost to the research community (Perneger, 1998). It also means that exploratory research that measures multiple variables is almost prohibited because of what Moran (2003) refers to as the hyper-red queen paradox and Webster et al. (2015) might call fishing for change. In other words the more complex and detailed the analysis the less likely a significant finding. Another problem is that the choice of statistical analyses may be guided by the need to obviate the need to perform a Bonferroni adjustment rather than what is appropriate for the data set under investigation.

It seems that using multiple tests inflates the risk of a Type 1 error and using the Bonferroni adjustment inflates the likelihood of a Type 2 error. Both outcomes are equally undesirable. It also appears that there is no consensus about whether to use the Bonferroni correction (VanderWeele & Mathur, 2019) or not (Cabin & Mitchell, 2000). The Bonferroni adjustment was not used in this study and this lack of control for the increased likelihood of a Type 1 error is an acknowledged limitation of this preliminary and exploratory study which is based on a very small sample of participants and replication of its findings would be required to confirm whether this decision was warranted.

4.6 Single Word Processing Statistical analysis

The non-parametric Wilcoxon matched pairs signed ranks test was used to evaluate the overall impact of activation therapy for the 7 PWA in this trial. This analysis has been used by other researchers such as Nickels and Best in 1996 who used it to compare pre and post therapy average word finding scores. A non-parametric test was used because the research involved seven PWA. This is a small sample and therefore the data are unlikely to represent the normal distribution needed to satisfy the requirements of a parametric analysis (Bridge and Sawilowsky, 1999; Micceri et al., 1989; Vickers, 2005). A non-parametric ranked assessment was also chosen because this therapy trial involved people with severe aphasia who could not find words easily (p1, p2 and p3) and participants with less severe aphasia who demonstrated much less difficulty (p4, p5, p6 and p7). Because the Wilcoxon matched pairs signed ranks test ignores the magnitude of change and focusses on whether or not change has occurred it allows people with different severities of aphasia to be included in the same analysis.

Another reason for choosing non parametric statistical analysis is because the data points come from the same person are not independent. Statisticians refer to this as auto correlation (Beeson & Robey, 2006), and although there is some debate about the serial dependency of data taken from the same person (Howard, Best & Nickels, 2015; Huitema, 1985; Laganaro, 2015; McNemar, 1947; Willmes, 2015), this investigation took a conservative approach to the choice of statistical analyses and used non parametric statistical analyses and accepted that, as Byng and Jones (1993, p. 375) suggested, who themselves referred to Howard and Hatfield (1987), finding a significant statistical analysis with such a small group of participants is hard.

The Wilcoxon signed-ranks test were performed using SPSS 24. Statistical tests used to compare published assessment results were analysed using a two tailed significance testing as it was important to capture any change in control assessments for sentence comprehension, non-verbal problem solving and cognitive flexibility skills. Whereas statistical tests used to compare before and after therapy scores were analysed using a one tailed significance testing as it was predicted that activation therapy would have a beneficial impact on word finding skills (Bixley, 1998).

4.7 Within Participant Control Measures

The difference in the severity of aphasia experienced by the seven participants in this therapy trial illustrates the way that aphasia affects individuals differently. The difficulty finding an equitable control group for aphasia intervention studies is highlighted by the Cochrane Library Review into Speech and Language Therapy for aphasia following stroke (Brady et al., 2016). 25/75, one third of the studies included in their review reported comparisons between two groups of PWA but did not describe these people in detail (10/25) or described comparisons between groups that differed from each other in stroke severity, aphasia severity, gender, age or the amount of therapy they received (15/25). Authors such as Darley (1972), LaPointe (1977), Howard (1986), Kazdin (1992), Pring (2004) and Lawton et al. (2019) suggest that the effect of therapy needs to be distinguished from other factors that might affect the language of PWA such as spontaneous recovery, maturation or non-specific effects of attending a course of activation therapy. All of these factors were reported in the Brady et al. (2016) review and will have affected the ability to compare groups of people with individual characteristics and aetiologies. This is alongside the impact on reliability of findings for the 10/75 studies in which these individual factors were not reported at all.

Even though it is difficult to find an equitable comparison group in aphasia research, comparison groups are still used to verify the findings of aphasia research studies. Nouwens et al. (2017) used a no treatment control group to compare and contrast the effects of therapy and no intervention. To use this type of control group one has to ignore not only the impact of individual differences but also the evidence to suggest that no treatment might disadvantage PWA (Pulvermuller & Berthier, 2008). It also ignores the premise that any form of intervention even initial assessment of language presentation and diagnosis is a form of therapy in itself.

Medical research recommends the placebo control as a way of attributing change to any given intervention (Wampold et al., 2005). However, Hrobjartsson and Gotzsche (2001) suggest that a true placebo might not exist in therapy trials because any kind of placebo could be considered an intervention. For example, Bowen et al. (2012) used a conversation control group to compare the effects of intervention and functional communication practise but if one considers conversation is a form of therapy (Bowen et al., 2012; Brady et al. 2016; Brady et al., 2016s; Kagan, 1995; Simmons-Mackie et al. 2014) then an alternative intervention is not a true placebo. Neither of these options were chosen for this study because it was considered that the individual differences inherent in all people with and without aphasia means that a true placebo control group, especially in a small scale study, is not possible and the best type of control for therapy trials involving seven people with aphasia is the participants themselves (Howard, 1986).

In this therapy trial three control measures were used to infer that without therapy the seven participants in this trial were unlikely to improve (Darley 1972; see also Howard, 1986; Kazdin, 1992; LaPointe, 1977; McNeil et al., 2011; Pring, 2004). The first was a no therapy comparison control group of equivalent words that were not targeted in therapy. The other control measures were performance in the Test for the Reception of Grammar 2 (Bishop, 2003) and The Standard Progressive Matrices (Raven, 2006). If therapy had resulted in a general improvement in language then the no therapy control words and assessment results should reflect this general improvement. If they did not improve then it is suggested that improvements in language function during activation therapy could be attributed to the results of intervention.

4.8 Snodgrass and Vanderwart (1980) Word Finding Assessment Results – Group

The same three 260 item Snodgrass and Vanderwart (1980) word finding assessments, Snodgrass and Vanderwart word finding 1, Snodgrass and Vanderwart 2 word finding 2 and Snodgrass and Vanderwart word finding 3 were conducted before therapy began a1, after participating in the first phase of activation therapy a2, and after completing the second phase of activation therapy (see Appendix 7 Word Lists for the Snodgrass and Vanderwart (1980) Three Word Finding Assessments). Each Snodgrass and Vanderwart (260) word finding assessment contained the words that had been allocated to one of three clinical trial groups, activation therapy with word finding words, activation therapy without word finding words and the no therapy control words.

To recap, the number of words in each of these sets varied between each participant and the rationale for this variation has been outlined in 4.2.3 Identifying Relevant Therapy Words from Word Finding Assessments**.** There was only one set of no therapy control words and this set was used to compare no therapy intervention for both phases of the therapy trial, therapy 1 and therapy 2 and this allocation has been outlined in Table 4.1 The Number of Words Allocated to One of the Three Therapy Trial Word Finding Sets for Each of the Seven Participants. The raw scores and raw data improvement obtained for each of the three word sets, before and after both types of activation therapy are presented in Table 4.3. Baseline, Outcome and Raw Data Improvement in Word Finding

Skills in the activation therapy with word finding, the activation without word finding and the No Therapy Control Sets. The combined raw data scores for the combined activation therapy sets are presented in Table 4.4 Raw scores obtained at each assessment occasion for the two therapy sets of words.

Table 4.3

Baseline, Outcome and Raw Data Improvement in Word Finding Skills in the activation therapy with word finding, without word finding and the No Therapy Control Sets

participant	P1				P2				P3			
therapy sequence	with without				without with				without with			
No. therapy items:	30				30				30			
data set	with	control	without	control	with	control	without	control	with	control	without	control
baseline 1	0.00	0.00	0.00	2.00	0.00	0.00	1.00	0.00	4.00	2.00	4.00	5.00
baseline 2	0.00	0.00	1.00	2.00	0.00	2.00	0.00	0.00	9.00	3.00	0.00	2.00
baseline 3	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	5.00	2.00	0.00	0.00
baseline av	0.00	0.33	0.33	1.67	0.00	1.00	0.33	0.00	6.00	2.33	1.33	2.33
baseline sd	0.00	0.58	0.58	0.58	0.00	1.00	0.58	0.00	2.65	0.58	2.31	2.52
outcome 1	2.00	2.00	1.00	1.00	1.00	1.00	0.00	0.00	8.00	2.00	5.00	2.00
outcome 2	2.00	2.00	2.00	2.00	1.00	0.00	1.00	2.00	8.00	2.00	3.00	3.00
outcome 3	2.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	9.00	4.00	4.00	2.00
outcome av	2.00	1.67	1.33	1.00	1.00	0.33	0.67	1.00	8.33	2.67	4.00	2.33
outcome sd	0.00	0.58	0.58	1.00	0.00	0.58	0.58	1.00	0.58	1.15	1.00	0.58
raw data impovement	2.00	1.33	1.00	-0.67	1.00	-0.67	0.33	1.00	2.33	0.33	2.67	0.00

participant	P4				P5				P6			
therapy sequence	with without				without with				without with			
No. therapy items:	31				30				24			
data set	with	control	without	control	with	control	without	control	with	control	without	control
baseline 1	5.00	4.00	16.00	17.00	6.00	12.00	2.00	6.00	11.00	8.00	4.00	4.00
baseline 2	5.00	8.00	16.00	15.00	10.00	16.00	4.00	9.00	16.00	8.00	7.00	4.00
baseline 3	7.00	6.00	15.00	13.00	6.00	14.00	4.00	11.00	11.00	11.00	5.00	7.00
baseline av	5.67	6.00	15.67	15.00	7.33	14.00	3.33	8.67	12.67	9.00	5.33	5.00
baseline sd	1.15	2.00	0.58	2.00	2.31	2.00	1.15	2.52	2.89	1.73	1.53	1.73
outcome 1	22.00	17.00	14.00	15.00	14.00	13.00	13.00	12.00	14.00	7.00	11.00	8.00
outcome 2	14.00	15.00	12.00	11.00	16.00	16.00	11.00	16.00	16.00	7.00	12.00	8.00
outcome 3	18.00	13.00	2.00	4.00	15.00	8.00	14.00	14.00	16.00	9.00	7.00	11.00
outcome av	18.00	15.00	9.33	10.00	15.00	12.33	12.67	14.00	15.33	7.67	10.00	9.00
outcome sd	4.00	2.00	6.43	5.57	1.00	4.04	1.53	2.00	1.15	1.15	2.65	1.73
raw data impovement	12.33	9.00	-6.33	-5.00	7.67	-1.67	9.33	5.33	2.67	-1.33	4.67	4.00

participant	P7			
therapy sequence	with without			
No. therapy items:	21			
data set	with	control	without	control
baseline 1	5.00	4.00	6.00	6.00
baseline 2	4.00	7.00	6.00	7.00
baseline 3	6.00	2.00	4.00	2.00
baseline av	5.00	4.33	5.33	5.00
baseline sd	1.00	2.52	1.15	2.65
outcome 1	11.00	6.00	7.00	6.00
outcome 2	4.00	7.00	7.00	3.00
outcome 3	6.00	2.00	9.00	7.00
outcome av	7.00	5.00	7.67	5.33
outcome sd	3.61	2.65	1.15	2.08
raw data impovement	2.00	0.67	2.33	0.33

Note. av = average. sd = standard deviation.

This table suggests that word finding in both therapy word sets were more successful than the word finding measured at the same time in the no therapy control set, apart from p2 and p4 activation therapy without and control comparisons.

Table 4.4

Raw scores obtained at each assessment occasion for the two therapy sets of words

pathway			with		without		total yes	a1 total sd	effect size	size
			av	sd	av	sd				
p1	with without	a1	0.00	0.00	1.00	0.00	1.00	0.55	6.67	small
		a2	2.00	0.00	1.33	0.58	3.33			
		a3	3.00	0.58	1.67	0.58	4.67			
p2	without with	a1	0.00	0.00	0.33	0.58	0.33	0.41	2.43	n/a
		a2	0.00	0.00	0.67	0.58	0.67			
		a3	1.00	0.00	0.33	0.58	1.33			
p3	without with	a1	3.00	1.00	1.33	2.31	4.33	1.83	8.97	medium
		a2	6.00	2.65	4.00	1.00	10.00			
		a3	8.33	0.58	3.00	1.00	11.33			
p4	with without	a1	5.67	1.15	4.67	3.21	10.34	2.23	19.36	large
		a2	18.00	4.00	15.67	0.58	33.67			
		a3	14.67	0.58	9.33	6.43	24.00			
p5	without with	a1	7.33	1.53	3.33	1.15	10.67	2.50	21.07	large
		a2	7.33	2.31	12.67	1.53	20.00			
		a3	15.00	1.00	10.33	2.08	25.33			
p6	without with	a1	8.00	1.73	5.33	1.53	13.33	2.07	18.56	large
		a2	12.67	2.89	10.00	2.65	22.67			
		a3	15.33	1.15	9.67	4.16	25.00			
p7	with without	a1	5.00	1.00	4.00	2.00	9.00	1.52	11.08	large
		a2	7.00	3.61	5.33	1.15	12.33			
		a3	9.33	1.53	7.67	1.15	17.00			

Note. = active activation therapy; av = average; sd = standard deviation; Effect size cannot be calculated where the standard deviation at baseline is 0 (effect size = a2 - a1/ a1 sd, Beeson & Robey, 2006). Beeson & Robey (2005) effect sizes for lexical retrieval studies small = 4, medium = 7 and large = 10.1.

This table suggests that when the raw score from both types of therapy were combined into a single total at each phase, activation therapy over the course of the therapy trial had a positive impact on word finding skills. Where effect sizes could be calculated (Beeson & Robey, 2005), the impact of activation therapy was large. The table also shows some evidence of within generalisation after participants had received their first phase of activation therapy (Webster et al., 2015) see without p1, p4, p7 - a1 to a2, and p3, p6 - a1 to a3. Generalisation may have also have occurred in the second phase of the therapy trial, see p1 and p7 - a2 to a3 but it would be hard to disentangle the impact the first phase of therapy and the generalisation of the second. The table shows that although dropping off slightly, participants maintained the word finding skills obtained in the first part of the therapy trial a1 to a2, six weeks later at a3 assessment.

It was not possible to use the raw data or percentage improvements obtained in this study to compare performance across the group of participants for the words in the two therapy groups and the no therapy control set of words. This was first, because participants had been allocated different numbers of therapy and matched control items (see 4.2.3 Identifying Relevant Therapy Words from Word Finding Assessment*s* for a detailed rationale for this). Second, it was also not possible to compare participant's responses to therapy and control items using effect individual effect sizes (Beeson & Robey, 2006) because p1, p2 had standard deviations of 0 at baseline and this lack of variation in initial measurement prohibits effect size calculations (single case effect size = outcome mean – baseline mean / standard deviation of baseline mean, Beeson & Robey, 2006 p. 165).

Finally, the choice of which form of data to use in group comparisons was also informed by the premise that participants demonstrated variable word finding skills in the a1 word finding assessments and therefore initial therapy and control sets may not have been equivalent. For example, in the first phase of the therapy trial p3 was provided with activation therapy without word finding, her activation therapy without word finding therapy set baseline was 1.33/30 words and the no therapy control set baseline was 2.33/30.

In addition to this difficulty, data gathered in the second phase of the therapy trial, a2 to a3, had a different potential to show change than the data that had been present in the first phase of the trial a1 to a2. In the second phase of therapy, p6's activation therapy with word finding baseline was 12.67/30 and the no therapy control set baseline was 9/30, whereas the initial baseline for these two word sets were 8.00/30 and 5/30 respectively. These variable baselines and altered potential for change needed to be accommodated in the data analysis used in this therapy trial.

To overcome this possible impediment of variable word finding baselines reducing the likelihood of finding a change in word finding skills in the second phase of therapy and thereby reducing the risk of a type 2 error, raw data was converted to a maximal gain calculation (Lambon Ralph et al., 2010 p. 294) and it is this calculation that was used to compare the impact of activation therapy with and without word finding with its impact on the control set of words that did not receive any therapy at all but were measured at the same time as the two therapy sets. Table 4.5 Raw Data, Percentage Improvement, Effect Size and Maximal Gain Calculation for Word Finding in the Two activation therapy Word Sets and the Therapy Control Set of Words summarises the maximal gain calculation calculations that were used as the basis of the comparison between therapy and control word finding skills and also the raw data, percentage improvement and effect sizes.

This table suggests that activation therapy had a beneficial impact on word finding scores except for p4 activation therapy without word finding which had a detrimental effect on p4's word finding skills. The data also shows that the impact of activation therapy generalised to no therapy words but there was no clear trend across the data set for one therapy generalising more successfully than the other.

Table 4.5

Raw Data, Percentage Improvement, Effect Size and Maximal Gain Calculation for Word Finding in the Two activation therapy Word Sets and the Therapy Control Set of Words

participant		P1				P2				P3		
therapy sequence		with without				without with				without with		
No. therapy items:		30				30				30		
data set	with	control	without	control	with	control	without	control	with	control	without	control
raw data impovement	2.00	1.00	0.33	-0.67	1.00	-0.67	0.33	1.00	2.33	0.33	2.67	0.00
percentage improvement	6.67%	3.33%	1.11%	-2.22%	3.33%	-2.22%	1.11%	3.33%	7.78%	1.11%	8.89%	0.00%
effect size		1.73	0.58	-1.15		-0.67	0.58		0.88	0.58	1.15	0.00
maximal gain calculation	6.67%	3.37%	1.16%	-2.33%	3.33%	-2.30%	1.12%	3.33%	9.72%	1.20%	9.30%	0.00%

participant		P4				P5				P6		
therapy sequence		with without				without with				without with		
No. therapy items:		31				30				24		
data set	with	control	without	control	with	control	without	control	with	control	without	control
raw data impovement	12.33	9.00	-6.33	-5.00	7.67	-1.67	9.33	5.33	2.67	-1.33	4.67	4.00
percentage improvement	39.78%	29.03%	-20.43%	-16.00%	25.56%	-5.56%	31.11%	17.78%	11.11%	-5.56%	19.44%	16.67%
effect size	10.68	4.50	-10.98	-1.11	3.32	-0.83	8.09	2.12	0.92	-0.77	3.06	2.31
maximal gain calculation	48.68%	36.00%	-41.30%	-31.25%	33.82%	-10.42%	35.00%	25.00%	23.53%	-8.89%	25.00%	21.05%

participant		P7		
therapy sequence		with without		
No. therapy items:		21		
data set	with	control	without	control
raw data impovement	2.00	0.67	2.33	0.33
percentage improvement	9.52%	3.17%	11.00%	1.59%
effect size	2.00	0.26	2.03	0.13
maximal gain calculation	12.50%	4.00%	14.89%	2.08%

Note. av = average. sd = standard deviation. Effect size cannot be calculated where the standard deviation at baseline is 0 (effect size = a2-a1 / a1sd Beeson & Robey, 2006). Maximal gain calculation allows comparison between therapy sets of different sizes and also accommodates the possible impact of generalisation from the first type of activation therapy on words within the second therapy set (maximal potential gain = outcome - baseline / number of therapy items - baseline Lambon Ralph et al., 2010 p.294).

Statistical analysis was conducted to address the first aim of this research project and its associated objectives

Aim 1. To evaluate and compare the impact of activation therapy with word finding and activation therapy without word finding by

Objective 1a. Comparing word finding in both activation therapy sets with word finding in an equivalent no therapy control set of words

Objective 1b: Comparing word finding skills in a set of words that had been provided with six weeks of activation therapy with word finding to the word finding skills in an equivalent set of words that had been provided with six weeks of activation therapy without word finding.

A Wilcoxon Signed Ranks Test (see Table 4.7 Wilcoxon Signed Ranks Test Used to Compare the Seven Participants' Maximal Gain Calculation of Spoken Word Finding Improvement in the Two activation therapy Sets with the Word Finding in the Equivalent No Therapy Control Set) was used to address the study's first objective by comparing the success of activation word finding therapy with an equivalent set of no therapy control words. The test was conducted using a one tailed test of significance because Bixley's (1998) previous research had identified the positive impact of activation therapy without word finding for three of the four participants in her 1998 therapy trial. Maximal gain calculations (Lambon Ralph et al., 2010) were used for the statistical comparison. (see Table 4.6 The Maximal Gain Calculations used to Compare Word Finding Skills in the Two Activation Therapy Sets with the Equivalent Word Finding Skills in the No Therapy Control Set of Words and 4.4 Measuring Word Finding Skills for the rationale for the use on the maximal gain calculation).

Table 4.6

The Maximal Gain Calculations used to Compare Word Finding Skills in the Two Activation Therapy Sets with the Equivalent Word Finding Skills in the No Therapy Control Set of Words

participant	atherapy	mgc	no therapy	mgc
p1	with	6.67%	control	3.37%
p1	without	1.16%	control	-2.33%
p2	with	3.33%	control	-2.30%
p2	without	1.12%	control	3.33%
p3	with	9.72%	control	1.20%
p3	without	9.30%	control	0.00%
p4	with	48.68%	control	36.00%
p4	without	-41.30%	control	-31.25%
p5	with	33.82%	control	-10.42%
p5	without	35.00%	control	25.00%
p6	with	23.53%	control	-8.89%
p6	without	25.00%	control	21.05%
p7	with	12.50%	control	4.00%
p7	without	14.89%	control	2.08%

Note. atherapy = activation therapy. mgc = maximal gain calculation

Table 4.7

Wilcoxon Signed Ranks Test Used to Compare the Seven Participants' Maximal Gain Calculation of Spoken Word Finding Improvement in the Two activation therapy Sets with the Word Finding in the Equivalent No Therapy Control Set

variable	both types of activation therapy average median	no therapy control average median	Z	1-tailed	effect size
score	11.11	1.64	-2.605	0.003	0.7

Note: Cohen's (1988) effect sizes = Z / √number of comparisons 0.1 small, 0.3 moderate, and 0.5 large.

The Wilcoxon Signed Ranks Test revealed a statistically significant increase in word finding skills following activation therapy Z = -2.605, p = 0.003, with a large effect size (r=0.70). The median maximal gain calculation for the both activation therapy word sets was greater (Md =11.11) than the median maximal gain calculation for the equivalent no therapy control set of words (Md = 1.64). This result suggests that activation therapy had an impact on word finding skills that could be attributed to intervention rather than any other non-specific reason because the improvement in word finding in the therapy sets was significantly more successful than the word finding in the equivalent set of words that had received no therapy (Darley 1972; see also Howard, 1986; Kazdin, 1992; LaPointe, 1977; McNeil et al., 2011; Pring, 2009).

A futher statistical analysis was conducted to address the second objective of this research study

> Objective 1b: Comparing word finding skills in a set of words that had been provided with six weeks of activation therapy with word finding to the word finding skills in an equivalent set of words that had been provided with six weeks of activation therapy without word finding.

The analysis comparing the results of activation therapy with word finding and activation therapy without word finding was based on the maximal gain calcultations presented in Table 4.8 Maximal Gain Calcuations Used to Compare the Impact of activation therapy with and without word finding on the word finding skills in the two activation therapy sets.

Table 4.8

Maximal Gain Calcuations Used to Compare the Impact of activation therapy with and without word finding on the word finding skills in the two activation therapy sets

participant	type of activation therapy	
	with	without
p1	6.67	1.16
p2	3.33	1.12
p3	9.72	9.30
p4	48.68	-41.30
p5	33.82	35.00
p6	23.53	25.00
p7	12.50	14.89

The analysis suggested that there was no significant difference between the impact of the two types of activation therapy on word finding skills. The calculation was two tailed because there was no evidence to suggest that one type of activation therapy was more successful than the other.

The values in Table 4.9 Maximal Gain Calcuations Used to Compare the Impact of activation therapy with and without word finding on the word finding in the equivalent no therapy control set, suggest that activation therapy appeared to have an impact on words that received no therapy, albeit this impact was not as great as the impact of activation therapy on word finding in the therapy sets. The analysis was conducted using the Wilcoxon Signed Ranks Test suggested that there was no significant difference between the impact the different forms of activation therapy on the words that had been assigned to equivalent no therapy control sets ($Z = -.169$, $p = 0.938$, activation therapy with contol set median =1.20 and activation therapy without control set median = 2.08). The analysis was two tailed as there is no evidence to suggest that the two types of therapy would have different impacts on no therapy controls.

Table 4.9

Maximal Gain Calcuations Used to Compare the Impact of activation therapy with and without word finding on the word finding in the equivalent no therapy control set

participant	type of activation therapy control	
	with control	without control
p1	3.37	1.16
p2	-2.30	3.33
p3	1.20	0.00
p4	36.00	-31.25
p5	-10.42	25.00
p6	-8.89	21.05
p7	4.00	2.08

The second aim of the therapy trial and its associated objective 2a was addressed by comparing a1 before activation therapy word finding skills to the word finding skills in their a1 and a3 Snodgrass and Vanderwart (1980) 260 word finding assessments.

Aim 2. To use word finding assessments as a way of evaluating the impact of activation therapy on word finding skills by

Objective 2a: Comparing word finding skills in three initial Snodgrass and Vanderwart (1980) 260 word finding assessments with the word finding skills in the same three Snodgrass and Vanderwart (1980) 260 word finding assessments after 12 weeks of activation therapy

Objective 2b: Compare differences in word finding skills to differences in control tasks that assess word finding skills, sentence comprehension and cognitive processing.

Table 4.10 Raw Word Finding Skills Data Used to Compare the Impact of activation therapy on the Seven Participants' Word Finding Skills at a1, a2 and a3 presents a summary of the raw scores that were used in a Wilcoxon Signed Ranks Test to compare word finding in the Snodgrass and Vanderwart (260) assessments before therapy had begun, a1, and at the end of the therapy trial, a3.

Table 4.10

Raw Word Finding Skills Data Used to Compare the Impact of activation therapy on the Seven Participants' Snodgrass and Vanderwart (1980) 260 Word Finding Skills at a1, a2 and a3

participant	p1	p2	p3	p4	p5	p6	p7
therapy sequence	with without	without with	without with	with without	without with	without with	with without
No. therapy items:	30	30	30	31	30	24	21
	av	av	av	av	av	av	av
a1 S&V1	1.00	5.00	55.00	97.00	116.00	134.00	143.00
a1 S&V2	3.00	3.00	53.00	136.00	124.00	159.00	162.00
a1 S&V3	3.00	2.00	43.00	119.00	140.00	166.00	161.00
a1 average	2.33	3.33	50.33	117.33	126.67	153.00	155.33
sd	1.15	1.53	6.43	19.55	12.22	16.82	10.12
a2 S&V1	7.00	6.00	47.00	192.00	144.00	153.00	164.00
a2 S&V2	9.00	9.00	68.00	164.00	155.00	172.00	162.00
a2 S&V3	5.00	5.00	57.00	165.00	146.00	150.00	162.00
a2 average	7.00	6.67	57.33	173.67	148.33	158.33	162.33
sd	2.00	2.08	10.50	15.89	5.86	11.93	1.53
a3 S&V1	11.00	9.00	59.00	144.00	149.00	166.00	157.00
a3 S&V2	13.00	8.00	55.00	147.00	166.00	169.00	147.00
a3 S&V3	11.00	7.00	62.00	70.00	126.00	175.00	147.00
a3 average	11.67	8.00	58.67	120.33	147.00	170.00	150.33
sd	1.15	1.00	3.51	43.62	20.07	4.58	5.77
total effect size	8.08	3.06	1.30	0.15	1.66	1.01	-0.49
raw data improvement	9.33	4.67	8.33	3.00	20.33	17.00	-5.00

Note. S&V= Snodgrass and Vanderwart (1980) 260 word finding assessment. av = average. sd = standard deviation. Effect size = a2-a1 / a1sd Beeson & Robey, 2006). Beeson & Robey (2005) effect sizes for lexical retrieval studies, small - 4, medium = 7, and large = 10.1.

Table 4.11 Wilcoxon Signed Ranks Test Used to Compare the Seven Participants' Scores in the Snodgrass And Vanderwart (1980) 260 Spoken Word Finding Assessments at a1, a2 and a3 presents the results of the Wilcoxon Signed Ranks analysis performed to compare a1 and a3 Snodgrass and Vanderwart (1980) 260 word finding skills. The analysis was one tailed as Bixley's (1998) research suggested that activation therapy without word finding had a positive effect on the word finding skills of three of the four participants involved in the study.

The significant results reported in Table 4.11 suggest that activation therapy had a positive impact on the overall word finding skills of the seven participants in this therapy trial and the effect size (Cohen, 1988) was large ($Z = -1.859$, $p = 0.039$, large effect size $r = .70$, median a1 word finding score = 117.33, and median a3 word finding score = 120.33). These group results suggest that activation therapy was beneficial and word finding skills improved because of twelve weeks of activation therapy.

Table 4.11

Wilcoxon Signed Ranks Test Used to Compare the Seven Participants' Scores in The Snodgrass And Vanderwart (1980) 260 Spoken Word Finding Assessments at a1, a2 and a3

variable	median a1	median a3	Z	1-tailed	effect size
word finding	117.33	120.33	-1.859	0.039	0.70

Note: Maximum score = 260. Cohen's (1988) effect sizes = Z / √number of comparisons 0.1 small, 0.3 moderate, and 0.5 large.

4.9 Snodgrass and Vanderwart (1980) Word Finding Assessment Results – Individual

The individual summaries presented in Table 4.12 Individual Results Summaries presents three types of individual results for each participant. First, activation therapy with and without word finding results presented alongside associated no therapy control results measured at the same time. These results are expressed in percentage improvement, effect size, maximal potential gain, raw data improvement and overall activation therapy effect size. Second, the original individual single word processing summaries have been updated with the final word finding scores. Third, a narrative summary connecting pre therapy single processing descriptions with summaries about the impact of activation therapy.

Table 4.12 Individual Results Summaries suggests that activation therapy with and without word finding affected participants in different ways and it had a beneficial effect on the word finding skills of all participants. p1 and p2 with the most severe aphasia showed the most evidence for generalised within level single word finding improvements (Webster et al., 2015) but activation therapy seemed to have a specific effect on the word finding skills of p1, p3, p4, p5, p6 and p7. This improvement was not connected to impaired spoken and written single word understanding (see p4, p5, p6, p7), to repetition skills (see p5), to relatively preserved single word writing skills (see p1) or relatively problematic writing skills (see p3). There did not appear to be a single factor that connected all these six participants apart from their individual positive response to activation therapy.

Table 4.12

Individual Results Summaries

	P1 - overall atherapy effect size 6.67				Participant 1 - 260 effect size 8.08 medium		single word processing narrative summary
therapy sequence	with without						problems understanding and producing speech
No. therapy items:	30				178/260	244/260	fewer problems with reading and writing
data set	with	control	without	control			plus difficulty repeating - probable aos
av percentage improvement	6.67%	3.33%	1.11%	-2.22%	16/260		overall medium effect size 6.67 - with more impact
effect size	n/a	1.73	0.58	-1.15			some generalisation - with atherapy
maximal potential gain	6.67%	3.37%	1.16%	-2.33%	av before 2.33/260	149/260	S&V 260 2/60 - 11.76/260 medium effect size
av raw data improvement	2.00	1.33	1.00	-0.67	av after 11.67/260		improvement is relative, 2.33/260 words pre therapy
	P2 - overall atherapy effect size 2.43				Participant 2 - 260 effect size 3.06		
therapy sequence	without with						spoken understanding and reading relatively intact
No. therapy items:	30				243/260	228/260	unable to speak or write
data set	with	control	without	control			difficulty repeating
av percentage improvement	3.33%	-2.22%	1.11%	3.33%	133/260		overall effect size 2.43
effect size	n/a	-0.67	0.58	n/a			some generalisation - without atherapy
maximal potential gain	3.33%	-2.30%	1.12%	3.33%	av before 3.33/260	4/260	S&V 260 3/60 - 8/260
av raw data improvement	1.00	-0.67	0.33	1.00	av after 8.00/260		improvement is relative, 3.33/260 words pre therapy
	P3 - overall atherapy effect size 8.97				Participant 3 - 260 effect size 1.30		
therapy sequence	without with						spoken understanding and reading relatively intact
No. therapy items:	30				224/260	236/260	spoken word finding better than written word finding
data set	with	control	without	control			relatively preserved repetition skills
av percentage improvement	7.78%	1.11%	8.89%	0.00%	227/260		overall atherapy effect size medium - both had impact
effect size	0.88	0.58	1.16				limited generalisation to 30 no atherapy control words
maximal potential gain	9.72%	1.20%	9.30%	0.00%	av before 50.33/260	17/260	S&V 260 48/260 - 58.67/260
av raw data improvement	2.33	0.33	2.67	0.00	av after 58.67/260		atherapy more impact on words in therapy sets
	P4 - overall atherapy effect size 19.36				Participant 4 - 260 effect size 0.15		
therapy sequence	with without						preserved spoken understanding and reading
No. therapy items:	31				260/260	256/260	both output modalities affected
data set	with	control	without	control			100% repetition
av percentage improvement	39.78%	29.03%	-20.43%	-16.00%	260/260		overall effect size 19.36 - atherapy with more effective
effect size	10.68	4.50	-10.98	-1.11			atherapy with produced time limited generalisation
maximal potential gain	48.68%	36.00%	-41.30%	-31.25%	av before 117.33/260	159/260	a1-117.33/260, a2-173.67/260, a3-120.33/260
av raw data improvement	12.33	9.00	-6.33	-5.00	av after 120.33/260		atherapy more impact on words in therapy sets
	P5 - overall atherapy effect size 21.07				Participant 5 - 260 effect size 1.66		
therapy sequence	without with						preserved spoken understanding and reading
No. therapy items:	30				256/260	259/260	written word finding better than spoken word finding
data set	with	control	without	control			plus difficulty repeating - probable aos
av percentage improvement	25.56%	-5.56%	31.11%	17.78%	156/260		overall atherapy effect size large - both had impact
effect size	3.32	-0.83	8.09	2.12			atherapy without more generalisation
maximal potential gain	33.82%	-10.42%	35.00%	25.00%	av before 126.67/260	190/260	S&V 260 127/260 - 147/260
av raw data improvement	7.67	-1.67	9.33	5.33	av after 147.00/260		atherapy more impact on words in therapy sets
	P6 -overall atherapy effect size - 18.56				Participant 6 - 260 effect size 1.01		
therapy sequence	without with						preserved spoken understanding and reading
No. therapy items:	24				254/260	260/260	both output modalities affected
data set	with	control	without	control			able to repeat
av percentage improvement	11.11%	-5.56%	19.44%	16.67%	256/260		overall effect size large - atherapy without more impact
effect size	0.92	-0.77	3.06	2.31			atherapy without more generalisation
maximal potential gain	23.53%	-8.89%	25.00%	21.05%	av before 153.00/260	194/260	S&V 153/260 - 170/260
av raw data improvement	2.67	-1.33	4.67	4.00	av after 170.00/260		atherapy more impact on words in therapy sets
participant	P7 - overall atherapy effect size 11.08				Participant 7 - effect size 0.49		
therapy sequence	with without						preserved spoken understanding and reading
No. therapy items:	21				258/260	258/260	speech output more affected than written output
data set	with	control	without	control			able to repeat
av percentage improvement	9.52%	3.17%	11.00%	1.59%	247/260		overall effect size large
effect size	2.00	0.26	2.03	0.13			limited generalisation
maximal potential gain	12.50%	4.00%	14.89%	2.08%	av before 155.33/260	231/260	a1-155.33/260, a2-162.33/260, a3-150.33/260
av raw data improvement	2.00	0.67	2.33	0.33	av after 150.33/260		atherapy more impact on words in therapy sets

Note. atherapy = activation therapy; atherapy with = activation therapy with word finding; atherapy without = activation therapy without word finding; av = average; Effect size cannot be calculated where the standard deviation at baseline is 0 (effect size = a2 - a1 / a1 sd, Beeson & Robey, 2006); Beeson and Robey (2005) effect sizes for lexical retrieval studies small = 4, medium = 7, and large = 10; n/a = not applicable. Maximal gain calculation allows comparison between therapy sets of different sizes and also accommodates the possible impact of generalisation from the first type of activation therapy on words within the second therapy set (maximal potential gain = outcome - baseline / number of therapy items - baseline, Lambon Ralph et al., 2010 p.294).

There is evidence of generalisation to control no therapy word sets evident for all participants and this suggests that the success of activation therapy cannot be attributed solely to an item specific effect (Nickels, 2002; Howard, 2000). The detailed analysis of p1's and p2's Snodgrass and Vanderwart (1980) 260 word set can be used to illustrate this point see Table 4.13 Detailed Analysis of p1's Snodgrass and Vanderwart (1980) 260 word set at a1, a2 and a3 and Table 4.14 Detailed Analysis of p2's Snodgrass and Vanderwart (1980) 260 word set at a1, a2 and a3. p1's results table which suggests that the impact of activation therapy was largely item specific and word finding improved when activation therapy was provided for individual word sets. Generialisation to non treated items which were in the same category as treated items is apparent for two words and these words were used as part of the activation therapy technique but were not targets for therapy. The impact of activation therapy with word finding was most apparent in the second phase of p1's therapy trial when he was receiving activation therapy without word finding.

Table 4.13

Detailed Analysis of p1's Snodgrass and Vanderwart (1980) 260 word set at a1, a2 and a3

p1 word	before therapy			with			without			with category	without category	therapy/generalised
Apple				1	1	1	1		1			therapy item
Arm							1				body parts	therapy item
Bear					1							
Bed					1							
Bee					1							therapy item
Bird							1	1	1		birds	generalised
Book							1	1	1			
Bus		1	1	1	1	1	1	1	1		vehicles	
Cake									1		food	therapy item
Cat									1			
Cup								1		crockery and cutlery		therapy item
Dog		1										
Eye								1			body parts	therapy item
Fork							1	1	1	crockery and cutlery		therapy item
Gun				1				1		weapons		generalised
Hat			1	1		1	1					
House	1	1	1	1	1	1	1	1	1			
Key									1			
Knife					1		1	1	1	weapons		generalised
Pen					1			1				
Pepper							1					
Pot						1		1				therapy item
Sun				1	1		1	1	1			therapy item
Telephone				1				1				
	1	3	3	7	9	5	11	13	11			

Note: categories targeted in activation therapy with word finding, weapons, toys, sky, sewing, musical instruments, kitchen, birds fruit, footwear, crockery and cutlery

Note: categories targeted in activation therapy without word finding, vehicles, tools, toys, sea animals, insects, house parts, garden, carrying things, food, body parts.

Table 4.14

Detailed Analysis of p2's Snodgrass and Vanderwart (1980) 260 word set at a1, a2 and a3

p2 word	before therapy			without			with			without category	with category	therapy/generalised
Airplane					1							
Ball	1					1					toys	therapy item
Bear							1					
Bed		1			1				1	furniture		generalised
Bee					1							
Bicycle							1				toys	therapy item
Book				1			1					
Bus				1			1	1	1			
Car							1	1	1			
Carrot						1						
Dog	1	1	1	1	1	1		1		domestic animals		generalised
Ear							1	1	1		body parts	therapy item
Fish				1								generalised
Foot	1								1		body parts	generalised
Garbage can							1					
Heart			1	1	1		1	1				generalised
House	1			1								
Refrigerator								1				generalised
Ring					1					personal possessions		therapy item
Sailboat									1			
Motorcycle					1							
Scissors								1			sewing	generalised
Star					1	1						
Television	1	1			1	1	1	1	1		household appliances	generalised
total	5	3	2	6	9	5	9	8	7			

Note: categories targeted in activation therapy without word finding, african animals, buildings, clothing, fruit, housework, personal possessions, sea animals, farm animals, kitchen applicances, toys.

categories targeted in activation therapy with word finding, birds, domestic animals, body parts, food, furniture, household appliances, musical instruments, self care, sewing, stationery.

p2's analysis suggest that direct therapy had an impact on word finding, but there was also more generalisation to words used in the activation therapy technique but not targeted in therapy.

4.10 Control Assessment Results

The second aim and associated objective 2b of this research project were

Aim 2. To use word finding assessments as a way of evaluating the impact of activation therapy on word finding skills by

Objective 2b: Compare differences in word finding skills to differences in control tasks that assess sentence comprehension and cognitive processing.

Assessments were conducted before therapy began and at the end of therapy see Table 4.15 Control Assessments Conducted During the Activation Therapy Trial for a visual summary of timing of the assessments used in the study.

Because TROG (Bishop, 2003) had an equivalent alternative assessment (TROG 2, Bishop, 2003), it was possible to conduct the assessment of sentence processing at the crossover point, a2. This was because the alternative format prevented participants becoming familiar with the assessment and learning how to complete it. The SPM (Raven, 2006) however did not have an alternative format and for this reason it was only conduced at the beginning and end of the therapy trial. The assessment results are summarised in table 4.16 Control Assessment Results.

The Wilcoxon Signed Ranks Test conducted to compare each participants' Test for the Reception of Grammar (Bishop, 2003) scores at a1 and a3 suggested that there was no significant difference between their ability to understand sentences before and after twelve weeks of activation therapy Z = -1.134, p = .500, a1 median = 7 and a3 median = 9. A further Wilcoxon Signed Ranks Test was used to compare each participants' scores on the Standard Progressive Matrices (Raven, 2006) before and after activation Therapy Z = -1.866, p = 0.63, a1 median = 41 and a2 median = 40 also showed no significant difference between participants' ability to use visual analogic thinking before and after activation therapy.

Table 4.15

Control assessments conducted during the activation therapy trial

variable	time of assessment		
	a1	a2	a3
assessment	TROG SPM	TROG 2	TROG SPM

Note. TROG and TROG 2 = Test for the Reception of Grammar (Bishop, 2003). SPM = The Standard Progressive Matrices (Raven, 2006).

Table 4.16

Control Assessment Results

assessment		time of assessment a1	a2	a3
TROG a1,a3	P1	2	2	3
TROG 2 a2	p2	7	9	7
	p3	0	1	0
	p4	6	6	9
	p5	17	15	17
	p6	16	18	17
	p7	16	19	15
SPM	P1	53		52
	p2	35		40
	p3	16		27
	p4	21		25
	p5	41		44
	p6	49		52
	p7	41		40

Note. TROG (a1 & a3) and TROG 2 (a2) = Test for the Reception of Grammar (Bishop, 2003).
SPM = The Standard Progressive Matrices (Raven, 2006).

Two tailed tests of significance were used in both of these analyses because Bixley's (1998) research had suggested that 20 sessions of activation therapy had not affected the sentence processing skills of the four participants in the activation therapy without word finding trial and to date there is no evidence to suggest that activation therapy would have an effect on non-verbal cognitive processing (Fonseca et al. 2016; Hula & McNeil, 2008; Marinelli et al., 2017; McNeil et al, 2011).

The non-significant 2-tailed result for The Test for The Reception of Grammar (Bishop, 2003) and The Standard Progressive Matrices (Raven, 2006) suggest that activation therapy did not have significant impact on understanding sentences or on cognitive flexibility and non-verbal problem solving skills. However, the Z score for the assessment of and The Standard Progressive Matrices (Raven, 2006) is very close to significance and this will be discussed in more detail in 4.13.2 Why did activation therapy Work? Control assessment results suggest that without activation therapy word finding skills are unlikely to improve. Their lack of significant change suggests that any improvement could be attributed to activation therapy rather than brain recovery, maturation or the general impact of contact with a therapist over a prolonged period of time (Darley 1972; see also Brady et al., 2016; CASP, 2020; Howard, 1986; Kazdin, 1992; LaPointe, 1977; McNeil et al., 2011; Pring, 2004).

Finally, participants were also rated again on the Aphasia Severity Scale at a2 and the end of the study, a3, see Table 3.1 Aphasia Therapy Rating Scale Table and Table 3.2 Participant and Therapy Trial Partner Biographical Data. There was no change between the ratings scored at a1, a2 and a3. They were identical. Because ratings like these are subjective (Brady et al., 2016; CASP, 2020) they were scored independently by the researcher and a Speech and Language Therapy Frontrunner. The ratings showed 100% agreement. This implications of this lack of change will be explored in chapter 7.5 within the Severity Ratings discussion.

4.11 Snodgrass and Vanderwart (1980) Word Finding Assessment Results Summary

The statistically significantly different group analyses results in this study suggest that words targeted in either type of activation therapy were accessed more frequently than words that had not been provided with therapy at all and this was a large effect (Cohen, 1998). It was not possible to separate the impact of activation therapy with word finding and activation therapy without word finding within group analyses. There seemed to be some indication that some participants responded more positively to one therapy than another but this could not be attributed to severity of aphasia, ability to repeat, ability to find words or any other individual characteristics that may be thought to be responsible for affecting response to therapy (Brady et al., 2016; CASP 2020).

Word finding improvements in the equivalent no therapy control set of words suggested that the impact of activation therapy had generalised within-level (Webster t al., 2015). Furthermore, comparison of the Snodgrass and Vanderwart (1980) 260 word finding assessments conducted before and after therapy also suggested that activation therapy had generalised to other words not targeted in therapy. This difference was also statistically significant and the effect size was large (Cohen, 1998).

Table 4.17

Summary of Word Finding Improvements Following Activation Therapy

variable	studies			raw data improvement			sessions		
	number	items range	average	average	sd	range	average	sd	range
therapy word finding improvement	1/1	21-31	28	6.14	5.21	1.33 - 17.00	12	0	12
generalisation of word finding improvement no treatment controls	1/1	21-31	28	1.76	1.64	0.33 - 4.00	12	0	12
260 word set	1/1	260	260	8.24	7.93	-5.00 - 20.33	12	0	12

Table 4.17 Summary of Word Finding Improvements Following Activation Therapy summarises these improvements in word finding skills which were apparent in context of stable within participant control measures, the stability of which suggests that improved word finding skills were not attributable to generalised brain recovery or to other less direct benefits of participating in this activation therapy trial (Darley 1972; see also Brady et al., 2016; CASP, 2020; Howard, 1986; Kazdin, 1992; LaPointe, 1977; McNeil et al., 2011; Pring, 2004).

4.12 Procedures used to Reduce the Possible Impact of Bias, Word Finding Assessments

This trial was conducted by a single researcher. It has to be acknowledged that the researcher was the person who invented activation therapy, designed the study, gathered the data, provided the therapy, chose how to analyse the data and evaluated the impact of activation therapy within this trial. The use of a single person to conduct the therapy trial is the biggest threat to the way in which the results from this study can be judged. Where possible and where relevant the design of this activation therapy trial study and the way that is was reported was underpinned and influenced by several recognised principles. These principles are not contained in one authoritative group therapy trial checklist for people with aphasia but have been amalgamated from several key publications and these include The Single-case Experimental Design Checklist (Tate et al., 2008), The Consolidated Standards of Reporting Trials (Moher et al., 2010), The Critical Appraisal Skills Programme Checklists for Randomised Controlled Trials Checklist (CASP, 2020), The Critical Appraisal Skills Programme Checklists for Qualitative Studies Checklist (CASP, 2018), The Cochrane Library Speech and Language Therapy for Aphasia Following Stroke (Brady et al., 2016), and The Template for Intervention Description and Replication (TIDieR) Checklist (Hoffman et al, 2014).

Two undergraduate Speech and Language Therapy student frontrunners were asked to address the premise that the lead researcher's evaluations were reliable (Cochrane, Brady et al, 2016; CASP, 2020; TIDieR, Hoffmann et al, 2014; CONSORT, Moher et al, 2010; SCED, Tate et al, 2008). The first frontrunner independently selected at random, two of the seven participants whose data would be used to assess inter-rater reliability judgements. This first frontrunner coded two out of seven participants' nine Snodgrass and Vanderwart (1980) 260 word finding assessments. The first frontrunner did not know when these 18 assessments, nine with p1 and nine with p4 took place, but coded each word in each assessment into one of seven codes able to find word, delay, meaning difference, sound difference, English word or unable to find a word at all.

The second frontrunner then compared the researcher's coding with the first frontrunner's coding. Nicholas and Brookshire (1993) supported by Hallgren (2012) provide a formula for calculating inter rater reliability measures to verify that assessments were conducted and measured consistently and reliably (agreements / agreements and disagreements X 100 Nicolas and Brookshire 1993). The agreement for successful word finding skills and word finding difficulties for P2 was 97.90% and for p4 was 97.30%.

Frontrunners also investigated whether the activation therapy delivered to two participants was delivered in the way that had been intended (Cochrane, Brady et al, 2016; CASP, 2020; TIDieR, Hoffmann et al, 2014; CONSORT, Moher et al, 2010; SCED, Tate et al, 2008). Brogan et al. (2020) and Kladouchou et al. (2017) also argue for the need to investigate whether or not therapy was described and delivered as planned. Hinckley and Douglas (2013) found that only 14% of 149 studies in their review of treatment integrity and or fidelity had achieved this benchmark.

Table 4.18

The Number of Associations Provided in Activation Therapy Sessions for Each Therapy item

variable	therapy with		therapy without		overall	
	av	sd	av	sd	av	sd
p2	9.80	1.00	10.90	1.10	10.40	1.10
p4	10.10	1.20	10.00	1.30	10.10	1.30

Note. av = average. sd = standard deviation.

In this study participants had to listen to a two minute description of therapy items that included at least eight pieces of information about things it was associated with (see 3.7.1 Activation Therapy With and Without Word Finding for a detailed description about activation therapy sessions). Table 4.18 The Number of Associations Provided in Activation Therapy Sessions for Each Therapy item summarises the number of associations provided to p1 and p4 in the activation therapy sessions and confirms that activation therapy was delivered in the way that had been intended. Further analysis also confirmed that in the activation therapy with word finding sessions participants were provided with 8-11 opportunities to practise word finding (p1 average 9.4 sd 1.6 and p4 average 10.2 sd 0.9).

4.13 Word Finding Results Discussion

4.13.1 *Word Finding Results Discussion Introduction*

This therapy trial was designed to investigate the impact of activation therapy on the word finding skills of PWA. It addressed the first and second aims of this therapy trial,

Aim 1. To evaluate and compare the impact of activation therapy with and activation therapy without word finding

Aim 2. To use word finding assessments as a way of evaluating the impact of activation therapy on word finding

Group statistical analysis comparing word finding skills before and after activation therapy suggested that activation therapy helped the word finding skills of the seven PWA participating in this therapy trial. The impact of activation therapy was greater for words that had been targeted in therapy. Words provided with no therapy, that had only been practised in word finding assessments, did not improve as much as words that had been used in the activation therapy sessions. The results of this small therapy trial suggest that the two types of activation therapy were equally successful. The two types of therapy affected individual participants differently but there was no discernible indicator that suggested that one type of therapy benefitted one type of participant more than any another.

The discussion that follows will consider the implications of these results from a clinical and theoretical perspective. Subsections will include a discussion of the possible mechanisms underpinning activation therapy. It will then consider the implications for the evidence base for people with severe aphasia and focus on how the results of this study might contribute to our understanding of the links between language therapy and cognition. In the final sections of this word finding results discussion chapter the focus will shift to considering activation therapy within prominent theories which underpin our understanding of word access and will include discussion about syntax and self-cueing, decompositional or non decompositional representation of meaning, and what meaning word finding difficulties might reveal about the structure of word meaning representation. The discussion chapter will conclude with a focus on the relationship between the results of this study and the continuity thesis.

4.13.2 *Why did activation therapy Work?*

PWA seem have difficulty finding words even after practising them. Research by Cave (1997) and Wheeldon and Monsell (1992) suggest that word finding skills of people without aphasia can improve even if a word is cued only once. The impact of priming can also be measured up to 48 weeks later. The word finding skills of the seven PWA in this therapy trial do not show the same pattern of implicit learning ability that the participants in the research conducted with people without aphasia (Cave 1997; Wheeldon & Monsell, 1992). Pre therapy assessments indicated that repeated opportunities to practise word finding did not result in improved word finding skills. This is typical for aphasia therapy trials. For example, a study conducted by Creet et al. (2019) only reported improved word finding through practice in four out of the 23 participants in their semantic feature analysis and repetition in the presence of a picture aphasia therapy trial.

In this trial, word finding skills improved after the first phase of therapy and this improvement was maintained at the end of the therapy trial. It was not possible to identify a difference between the impact of activation therapy with word finding and activation without word finding. In conjunction with the results of Bixley's (1998) therapy trial these results suggest that it is unlikely that the opportunity to practise word finding was the only reason for the success of activation therapy in this therapy trial. This result is at variance with the aphasia therapy community's pervasive perception (Collins & Pinch, 1993) that word finding practice makes perfect (Howard, 2000; Howard et al, 2006; Nickels, 2002)

Kiran's (2008) typical and atypical category member training research demonstrated that therapy that focusses on accessing meaning generalises (see also Kiran & Johnson, 2008: Kiran et al., 2011). Studies that provide semantic feature analysis therapy also demonstrate the impact of meaning therapy that generalises to words not targeted in therapy (Boyle, 2004; Coelho et al., 2000; Delong et al., 2015; Haentjens & Auclair- Ouellet, 2020; Wambaugh et al., 2014). The results of this present study provide evidence to support word finding generalisation that was observable in the no therapy control set of words and in the Snodgrass and Vanderwart (1980) 260 word finding set (see Table 4.9 Raw Word Finding Skills Data Used to Compare the Impact of activation therapy on the Seven Participants' Snodgrass and Vanderwart (1980) 260 Word Finding Skills at a1, a2 and a3; Table 4.13 Detailed Analysis of p1's Snodgrass and Vanderwart (1980) 260 word set at a1, a2; a3 Table 4.1 Detailed Analysis of p2's Snodgrass and Vanderwart (1980) 260 word set at a1, a2 and a3)

The Snodgrass and Vanderwart (1980) picture set is organised into fuzzy categories (Kiran et al., 2011) that has modifiable definitions and modifiable category boundaries (Battig & Montague, 1969). An explanation for the within level generalisation that was observed in this study is that the Snodgrass and Vanderwart (1980) 260 picture could be considered a category of words in itself. A fuzzy category of items that share features such as familiarity (Funnell & Sheridan, 1992), concreteness (Warrington 1981) and operativity (Gardner, 1973). The impact activation therapy not only supported meaning recruitment for target therapy items, it also supported meaning recruitment for words with similar meanings and those that shared similar features (Dell & O'Seaghdha, 1991) such as familiarity, concreteness and operativity (Funnell & Sheridan, 1992; Gardner, 1973; Warrington 1981).

Evidence for within level generalisation is very limited, according to Webster et al.'s (2015 p. 1240) review of ten papers and is limited to sometimes contradictory reports of generalisation happening at word and sound processing levels. Their review also suggests that within level generalisation at the semantic processing level is limited and based on a very limited set of words. Table 4.18 Comparison of activation therapy trial to 68 published and peer reviewed word finding studies summarises the within level generalisation analysis that was conducted on the 68 studies contained in Figure 2.4 Microsoft Excel Worksheet Summary of 68 Aphasia Noun Word Finding Therapy Studies and compares the average word finding improvements in these studies to the word finding improvements noted in this study.

Activation therapy compares favourably with these studies. Activation therapy was productive in 12 sessions, was productive for people with all types of aphasia (Boyle, 2010), its impact generalised to words not used in therapy, and was long lasting (see Table 4.9 Raw Word Finding Skills Data Used to Compare the Impact of activation therapy on the Seven Participants' Snodgrass and Vanderwart (1980) 260 Word Finding Skills at a1, a2 and a3 and also refer to the need to use maximal gain calculations to accommodate for therapy gains in the second half of the therapy trial).

Table 4.19

variable	studies			raw data improvement			sessions		
	number	items range	average	average	sd	range	average	sd	range
therapy word finding improvement	33/68	6-110	40.43	11.91	9.02	1 - 42	22.87	23.97	1-110
of which had participants more than 1 year TPO	23/68	12-100	41.41	13.49	9.24	1 - 42	30.80	27.86	3-110
generalisation of word finding improvement	19/68	12-100	42.51	7.36	7.22	1 - 29	21.53	25.59	1-110
of which had participants more than 1 year TPO	11/68	12-100	43.17	7.09	5.75	2 - 27	28.81	31.29	1-110
Bixley 2021									
therapy word finding improvement	1/1	21-31	28	6.14	5.21	1.33 - 17.00	12	0	12
generalisation of word finding improvement no treatment controls	1/1	21-31	28	1.76	1.64	0.33 - 4.00	12	0	12
260 word set	1/1	260	260	8.24	7.93	-5.00 - 20.33	12	0	12

Note. TPO = time post onset.

When analysing the impact of activation therapy on the seven individuals in this trial it is difficult to identify any one specific indicator that would suggest why they benefitted from it. Within both types of activation therapy sessions, participants listened to descriptions of therapy items that included information about how the word sounded, what the word meant, how the word looked, and how the word was connected to other words. All seven participants in this trial showed difficulty accessing both spoken and written output (see Figure 4.1 Participants' Single Word Processing Summaries Presented as Seven Single Word Processing Models).

Hillis et al. (1998) suggested that this duality of output accessing difficulty is indicative of people with meaning accessing difficulties, participants experienced difficulties recruiting the meaning representation with enough impetus to cross the meaning word form rift (Howard et al., 2006; Lambon Ralph et al., 2000; Levelt et al, 1999). Furthermore, p1, p2 and p3 also had the most difficulty understanding speech and writing and Hillis and Caramazza (1991) suggested that difficulties with understanding in both modalities is also indicative of a problem accessing meaning. Oppenheim (2010) would suggest that these participants had difficulty accessing and activating the dynamic interconnected distributed word representation. This difficulty in accessing and activating word meaning suggests that p1, p2 and p3 would benefit from accessing meaning for comprehension (Fleming, 2021; Morris & Franklin, 2012) as well expression, but the former would not be re-assessed as two of the underpinning principles of the study were to lighten the load of assessment and to avoid, where possible the impact of assessment as a form of therapy.

Activation therapy did not prevent the PWA silently repeating and rehearsing words. Geva et al. (2011) and Langland-Hassan (2016) suggested that inner voice is the ability to hear words in your head, furthermore Levelt et al. (1999) suggested that accessing inner voice requires relatively intact single word processing skills because it recruits all stages of spoken word understanding and all stages of spoken word output. p3 (227/260), p4 (260/260), p6 (256/260) and P7 (247/26) were all able to repeat words with relative ease and it is likely that they silently rehearsed therapy and non-therapy words during activation therapy with and activation therapy without overt word finding. p1 16/260), p2 (133/260) and p5 (156/260) had more difficulty with repetition and could not use this process reliably, however, it is entirely possible that they tried to repeat words silently in their heads. For these latter three participants who could not repeat easily is also less likely that the success of activation therapy could be attributed to the benefits of spreading activation within sound level processing (Leonard et al., 2008) or improved access to word level representations as a result of silent repetition (Howard et al., 2006; Robson et al, 1998), however, it is entirely possible that they tried.

From Allport's (1985) perspective, activation therapy was successful because it strengthened the connections within the distributed language memory pattern. It made all parts of the language memory for therapy words more accessible, even their phonological elements which underpin spoken word finding. By repeatedly accessing and connecting all parts of a word's underlying meaning and phonological representations, it alleviated the "graceful degradation" (Allport, 1985, p. 57) of a language system that is apparent in the variable, uncertain, incomplete, inaccurate, impoverished and slowed word finding skills apparent in people with aphasia. This explanation of the reason for the success of activation therapy suggests that listening to a word's description combined with possible repetition using available inner voice processing helped the seven PWA in this therapy trial to find words more successfully and activation therapy enabled them to bridge the difficulty they experienced initiating meaning and crossing the rift to activate word form and sound level representations (Lambon Ralph, 2000; Levelt, 1999). What was not required however was spoken word finding practice and this suggests that the active ingredient of activation therapy was the enhanced interconnectivity of the representations that underpin single word noun processing brought about by listening to elaborated definitions linked with the words that are signified by these definitions and those from which they are differentiated.

To summarise, results of this activation study contradict Howard (2000), Nickels (2002), and Pulvermuller and Berthier's (2008) suggestion that practising word finding is a key ingredient for improved word finding skills. It is also different to the majority of influential word finding research in which spoken word finding is a very important part of word finding therapy (Best et al., 2013; Cave 1997; Palmer et al., 2018; Wheeldon and Monsell, 1992) and research that measures the impact of meaning therapy over a short time course such as the immediate impact of meaning prompts (Barry and McHattie, 1991; Howard et al., 2006; Lyalka et al., 2020). The results from this small scale study suggest that it is not necessary to practise spoken word finding for word finding skills to improve. This confirms Bixley's (1998) research that suggested that word finding for three out of four participants improved without word finding practice after 20 sessions of activation therapy. However, this study suggests that the impact of activation therapy can be measured over a shorter time period six weeks. It also demonstrates that the impact of activation therapy without word finding was just as successful as a therapy with word finding and will therefore provide an evidence base for the impact of word finding therapy for people with all types of aphasia.

4.13.3 ***Implications for People with Severe Aphasia***

The results of this activation therapy trial, in conjunction with Bixley's (1998) study, suggest that activation therapy may be relevant for people who would benefit from word finding therapy but for some reason cannot say words out loud. Boyle's (2010) detailed review of the benefits of semantic feature analysis reported that one of the 17 participants in the seven therapy studies she reviewed included one participant with severe aphasia. Her conclusions suggested that there was not enough evidence to recommend the use of semantic feature analysis for people with severe aphasia.

In the analysis conducted on 68 peer reviewed word finding therapy studies in Figure 2.4 Microsoft Excel Worksheet Summary of 68 Aphasia Noun Word Finding Therapy Studies, only five out of 68 studies included people with severe aphasia as participants (Ball et al., 2011; Bixley, 1998; Code et al., 2010; Robson et al., 1998; Visch Brink et al., 1997) and only one of these studies could identify improved spoken word finding skills (Bixley, 1998; Code et al., 2010; Visch Brink et al., 1997) and relate this to the application of a single therapy technique and this was Bixley's (1998) study. These summaries suggest that there is very little evidence based research to support the implementation of spoken word finding therapy for people with severe aphasia. The results of this present study can be added to this spoken word finding intervention evidence base for those different types of aphasia and for these with severe spoken output problems because the results seem to suggest that PWA do not have to practise spoken word finding for word finding to improve.

4.13.4 ***Implications for Language Therapy and its Links to Cognition***

McNeil et al. (2011) amongst others, highlighted the impact of short term memory and attention on language processing. This kind of viewpoint suggests that suggest that improved attention, improved working memory and executive function will result in improved language processing. Furthermore, a twelve week trial of activation therapy and associated assessments should have beneficial impact on all of these non-verbal skills because participants needed to attend to therapy and practise holding words in short term memory and the Standard Progressive Matrices (Raven, 2006) Wilcoxon Signed Ranks Test (see 4.10 Control Assessment Results), using a 2 tailed significance level showed a near significant result.

Analysis of the Standard Progressive Matrices (Raven, 2006) results from the seven participants suggested that there was no single indicator that could explain their assessment results. Five of the seven participants showed improvement in their assessment scores from a1 to a3 (p2, p3, p4, p5 p6). Anecdotally there is no doubt that familiarity with the assessment format may have affected the results of the second administration of p3 and p4's Standard Progressive Matrices (Raven, 2006) who, when they first saw the assessment appeared to be intimidated by it. However, familiarity with the assessment does not explain why two participants, p1 and P7 did not show improvement between assessments a1 and a3. that seems to be able to explain the reason for the differential improvement of the seven participants in the study. Moreover p1's lack of improvement was not related to impaired cognition as he attained the highest score in all 14 administrations of the Standard Progressive Matrices (Raven, 2006) conducted during this trial. This high score and the lack of a clear link between language loss and cognitive status underscores that the link between language and cognition can and does disassociate.

If activation therapy brought about improvements in attention and short term memory then this would be a positive by-product of attending an activation therapy trial but the significant improvements in word finding suggest an item specific improvement that was greater words that were targeted in therapy. If enhanced cognition was responsible for language gains, these gains should have affected therapy word sets and no therapy control word sets equally. The results of this study suggest that activation therapy was responsible for the greater accessibility of words because all three types of control measure remained relatively unchanged. This means that the results of this exploratory study does not support the literature that implicates improvements in attention and short term memory as key prerequisites of language therapy gains (Hula & McNeil, 2008; McNeil et al, 2011).

4.13.5 ***Linking Word Finding Difficulties with Prominent Theories of Word Processing – Introduction***

The two prominent theories about how words are processed in the brain have some commonalities and some differences. Levelt et al. (1991, 1999) argue for a single word processing model in which meaning information, word and grammatical information and sound information are stored in three distinct stages and they refer to these as lexical concepts, lemmas and phonological words. In this type of conceptualisation each stage of processing happens independently. They also happen in a strict order of access in a feedforward mechanism in which meaning influences word and grammatical information choices and then word and grammatical information influence sound selection. An opposing viewpoint is supported by authors such as Dell and O'Seaghdha (1991). These authors agree that word processing includes three stages of processing: meaning, word and grammatical level and sound level processing. However, the key difference between the models is that Dell and O'Seaghdha (1991) suggest that processing within this type of model feeds backwards as well as forwards. Meaning processing can affect sound processing and sound processing can influence word and meaning accessing.

This very brief description of the differences between the two prominent theories of word processing will form the basis of the discussion that follows. The discussion is divided into five sections. Each of the five sections describes the type of word finding difficulties encountered by the seven participants in this therapy trial and relates them to current theories of word finding and people with aphasia. Explanations for three types of word finding difficulty seem to fit very neatly with Dell and O'Seaghdha's (1991) and Schwartz et al. (2006) feedforward and feedback processing models. These subsections will be discussed first and are word syntax and self-cueing, meaning representations, and the origin of meaning difficulties. Two types of word finding difficulty did not fit very neatly into either type of model and seemed to suggest that word finding difficulties may not represent a continuum of accessing problems and that plural markers may not be stored individually within word level representations. These two sections will be presented at the end of the upcoming discussion.

4.13.5 *Linking Word Finding Difficulties with Prominent Theories of Word Processing - Syntax and Self-Cueing*

Participants in this study used syntactic frameworks to self-cue themselves within the word finding assessments conducted in this study. They used sentence level grammar to cue themselves for example p6 supported his word finding by using the sentence cues "it's a" "that's a". p4 and p3 also used a contracted form of "that's a" "sa" to cue themselves. The use of this type of cue was used very frequently in the data set but there was no indication whether it was used instinctively or as a conscious self-cueing strategy. Whichever way it was used, the strategy seemed to have a beneficial effect on the word finding of p3, p4, p5, p6 and p7 who were able to access sentence level output.

Participants also demonstrated knowledge of word grammar to support their word finding. Herbert et al. (2014) suggested that syntactic information about a word is stored within its word level representation. Here information about its class, grammatical gender, plural form and mass and count status is stored alongside information about the word itself. Herbert (2014), Levelt et al. (1999) and Schriefers (1993) suggest that although these bits of information are stored together word form syntax is not always accessed at the same time as word form representations. Whether intuitively or as part of a self-initiated strategy all participants in this study accessed information about a word's syntax.

For example, p6 used the appropriate count noun marker "a" to cue himself into words such as bottle and hat. He demonstrated explicit knowledge of the syntax of a count noun. p7, p5, and p4 also showed an ability to find an associated article and use it to self-cue. P3 was only able to achieve this support twice in the 2340 words she tried to say in her nine 260 Snodgrass and Vanderwart (1980) word finding assessments. P1 and p2 did not self-cue in this way at all. This appears to suggest that the ability to use this type of self-cue is related to severity and person with severe aphasia has difficulty accessing both words and noun syntax.

p4 and p6 also demonstrated explicit knowledge of which words required the article "an" rather than the article "a". p4 cued herself into arrow by saying "an" and p6 cued himself into the word envelope by also saying "an". The appropriate use of the right article across the data set seems to suggest that self-cueing with the corresponding article relies on a reciprocal interplay of concept, word and sound level information. Sound level information evident in the use of "an" is cued by concept and word level information about "elephant" but "elephant" is not accessible enough for the word to be produced. The associated word syntax cue provides the added impetus for successful word finding and the success of cueing can be explained by either of the prominent models of single word processing (Dell & O'Seaghdha, 1991; Levelt et al., 1991).

Another example of possible syntactical self cueing across the data set was when participants used noun collocation cues to help them find words. P4, p5, p6 and p7 used collocation self cueing in all assessments. p4 said wishing well for well in a2, p5 said grand piano for piano in a1, p6 said wire hanger for hanger in a3 and p7 said wine bottle in a3. Although these collocation self cues were used in all assessments there seemed to be an incremental increase from a1 when they were used 24 times, a2 when they were used 37 times, and a3 when they were used 45 times. Moreover, this increase was apparent for all four participants.

The use of collocation cueing appears to incorporate access to a less familiar and less frequent word to enable articulation of a more familiar and frequent word. According to Levelt et al., (1999) this may have included the participant adopting a particular perspective (grand piano vs piano). Using Dell and O'Seaghdha (1991) interactive model of single word processing, this type of self cueing can be explained by the summation of related representations which resulted in the less frequent collocation network receiving the requisite amount of activation before its more frequent alternative. Whatever theoretical perspective is used to explain how collocation cueing works, participants seemed to use collocation self cueing to help them find word finding responses that would normally be accomplished by accessing a single word (Snodgrass & Vanderwart, 1980). This type of cueing adds to the argument in the previous paragraph that suggest that some aspects of noun syntax are accessible and used by PWA when they have word finding difficulties.

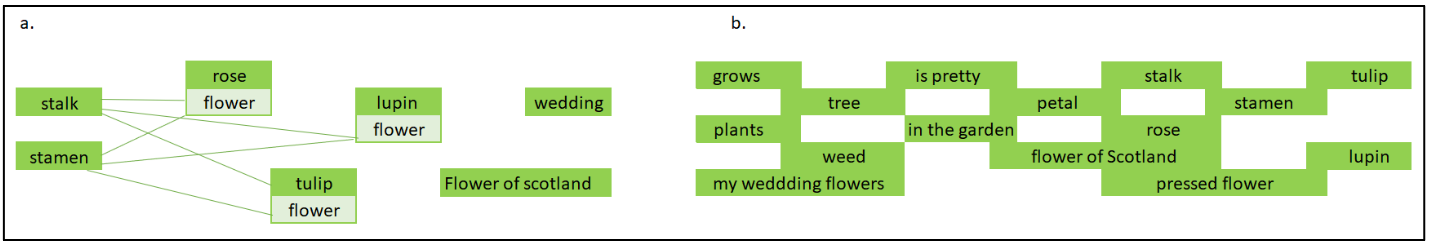
P3, p4, p5 and p6 also demonstrated an increased ability to cue themselves into word by using a chain of associated words to find the target word, in much the same way as activation therapy had presented a list of associations to them p3 0-6, p4 0-16, p5 0-5 and p6 1-9). This adoption of an activation self cueing strategy is aligned to the semantic feature analysis self cueing that Wambaugh et al. (2013) had taught their nine participants to use a semantic feature analysis mediating strategy. It is noteworthy that four of the seven participants in this study appeared to adopt the strategy spontaneously for themselves.

4.13.6 *Linking Word Finding Difficulties with Prominent Theories of Word Processing - Decompositional Meaning Features or Non Decompositional Lexical Concepts*

The two competing ways of thinking about single word processing conceptualise the way in which meaning is stored in different ways. Dell and O'Seaghdha (1991) suggested that meaning is stored as a distributed memory of conceptual features. They suggest that meaning is defined by the way that individual semantic features are connected together in pattern of activation. The alternative viewpoint was supported by Roelofs (1992). He suggested that the word's meaning was stored as a chunk of complex memory and Roelofs (1992) and Levelt (1999) referred to this as a lexical concept.

Figure 4.2

Visual Representation of the Possible Differences Between the Representation of the Non decompositional Lexical Concept Flower (a.) and the Decompositional Semantic Features (b.) Meaning Representation of Flower



They proposed that each lexical concept represented a recoded memory of the basic constituents of meaning and it was the abbreviated representation that reduced memory loading (Roelofs, 1997). They also proposed that it non decompositional storage solved the verbalisation problem (Bierwisch & Schreuder, 1992; Levelt et al., 1999) which occurs when perspective taking guides the choice of the word chosen to refer to the same concept, for example in referring to one’s mother when talking to her partner, her sister, her grandson, your sibling, your partner, your child or your grandchild. Figure 4.3 Visual Representation of the Possible Differences Between the Representation of the Non decompositional Lexical Concept Flower (a.) and the Decompositional Semantic Features (b.) Meaning Representation of Flower presents a visual representation of the two different ways of thinking how meaning memory might be stored. In this model meaning is defined either as Roelofs (1992) chunked lexical concept memory for flower or as Dell and O’Seaghdha’s (1991) combination of a word’s features such as its function, most salient feature, location, category membership, co-ordinates, synonyms, antonyms, subtypes, parts of, idiosyncratic associations, collocations, sentence completion and idiosyncratic association.

Participants in the trial encountered a variety of meaning difference word finding difficulties that are also referred to as semantic errors. These meaning word finding difficulties were related to the target word in different ways and represented 17.85% of the 16,380 data set. Meaning difficulties were coded into 13 different ways in which word finding difficulties could be related to the target word. Table 4.20 The Percentages of the Different Types of Meaning Word Finding Experienced by the Seven Participants During the 63 Snodgrass and Vanderwart (1980) 260 Word Finding Assessments shows examples of each of these different types of word finding difficulties and also how often they occurred in the data set. The most common type of meaning difference were coordinates and the least common type was the collocated word self-cue.

Both types of single word processing models, decompositional (Dell & O'Seaghdha, 1991) and non decompositional (Levelt et al. 1999) suggest that meaning difficulties can arise because of impaired access to meaning. Dell and O'Seaghdha (1991) suggest that meaning differences occur because associated words share meaning features and during word activation an activated competitor may be selected instead of the target (Schwartz et al., 2006). They attribute this mis selection to noise in the system. Alternatively, Levelt et al. (1999, p12) suggest that interference can occur at the conceptual meaning level when there is difficulty finding the right pragmatic and context dependent perspective.

Table 4.20

The Percentages of the Different Types of Meaning Word Finding Experienced by the Seven Participants During the 63 Snodgrass and Vanderwart (1980) 260 Word Finding Assessments

type	percentage	target word	example meaning difference
co ordinate	30.46	artichoke	broccoli
associated word	19.42	church	god
uses part of the word	12.93	sweetcorn	cornflower
synonym	10.38	pig	piggy
description	7.29	spinning wheel	a loom of some sort
plural	5.43	horse	horses
associated sound	4.40	cockerel	cockadoodledoo
type of	2.78	hat	trilby
category	2.75	goat	animals
associated verb	2.41	shirt	ironing
associated song	0.89	wheel	rolling rolling rolling rawhide
visual	0.86	toe	thumb

Note. Meaning differences occurred 2909 times in in the 63 administrations of the Snodgrass and Vanderwart (1980) 260 picture set.

One of the key arguments used to explain Levelt et al.'s (1991) approach is that a word's meaning cannot be decomposed into its parts and therefore the authors claim that superordinate terms are never used to replace a subordinate term. They state there is "not the slightest evidence" (Levelt et al., 1999 p. 4) that speakers do this. This research project provides exactly this type of evidence from each of its seven participants. p1 used the term barn for farm, p2 used the term food for grapes, p3 used the term orchestra for French horn, p5 used the term hat for cap, p6 used the term insect for beetle and p7 used the term instrument for French horn. 80 words, 2.75% of 2909 meaning word finding difficulties in this data set provided evidence to support the view that superordinate terms did replace subordinate terms.

The meaning differences that were found in this data set are also indicative of a meaning system in which all types of words that help define a concept can be selected instead of the target and therefore do not offer support for the non decompositional theory (Roelofs, 1992; Levelt et al, 1999) for the representation of word meaning. These types of word finding difficulties are different from those found in research conducted by Marshall et al., (1996) in which their single participant, RG's use of abstract less frequent terms was attributed to retained access to verbal information but a difficulty accessing information visually. So much so he referred to a doctor as "for the purposes of health" and a mayor "local privilege" (Marshall et al. 1996, p. 241). The types of word finding difficulty where god is chosen instead of church and trilby instead of hat suggest that somehow a semantic feature that helps to define a concept is chosen instead of it. They also show a substitution of a more frequent word for a less frequent word. It could be argued that this data set provides evidence to support a decomposed (Dell & O'Seaghdha, 1991; Schwartz et al, 2006) way of storing information about meaning and if the system malfunctions a semantic feature that adds detail to a concepts' meaning and is very closely related to the target word will be selected in its stead.

Table 4.21

Evolution of Seven Different Words Produced by Seven Different Participants Through Nine Word Finding Assessments

variable	p1 finger	p2 axe	p3 blouse	p4 lightbulb	p5 cannon	p6 peg	p7 cotton reel
a1S&V1	feet	unable	ironing	lamp	delay	clothes peg	needle
a1S&V2	unable	hammer and nails	trousers	lamp	cannon ball	clothes peg	needle
a1S&V3	unable	unable	jacket	unable	delay	wooden pegs	unable
a2S&V1	unable	bus	dress	switch	gun	wooden pegs	needle
a2S&V2	unable	timber	dress	not light	cannon ball	clothes peg	needle
a2S&V3	unable	mow the lawn	dress	bulb	gun	pegs	unable
a3S&V1	unable	hansen	watch	yes	yes	wooden pegs	cotton
a3S&V2	foot	hut hack	dress	switch lamp	yes	clothes peg	unable
a3S&V3	foot	timber	t-shirt	yes	yes	wooden peg	unable

Note. S&V = Snodgrass and Vanderwart (1980) 260 word finding assessment.

It is important to note that this process is not an all or nothing process. All of the participants in the study showed variation in word finding skills across the nine therapy trials. Table 4.21 Evolution of Seven Different Words Produced by Seven Different Participants Through Nine Word Finding Assessments presents seven examples, demonstrates this phenomenon for all seven participants. Nickels (2002) referred to this variability as the hallmark of aphasia. In this therapy trial this variability suggested that decomposed semantic features were sometimes accessible when the target word was not. They therefore provide further support for meaning being stored as a set of features rather than a non-decomposed holistic entity.

4.13.7 *Linking Word Finding Difficulties with Prominent Theories of Word Processing - Meaning Word Finding Difficulties – Where Do They Come From?*

Levelt et al. (1991) and Dell and O'Seaghdha's (1991) suggest that a person who experiences word finding difficulties because of difficulties accessing meaning, might produce an associated word rather than the word they had intended. In addition to this explanation for meaning differences, Dell and O'Seaghdha (1991) and Schwartz et al. (2006) propose that a difficulty accessing the word level representation of a concept may also result in a person with aphasia producing an associated word rather than the word they had intended (Caramazza & Hillis, 1990). Furthermore, Dell and O'Seaghdha's (1991) and Schwartz et al.'s (2006) also suggest that concept selection can also be influenced by difficulties with sound level processing. These authors suggest that mixed errors are the result of the interaction of meaning and sound representations which jointly trigger the word finding difficulty.

Levelt et al. (2001, p. 13467) suggest that these mixed errors are rare and do not accept the premise that sound and meaning levels interact. They concede that sometimes two synonymous concepts such as close and near may be activated at the same time and the resulting mixed word finding difficulty, clear, would show aspects of both words and they extend their claim to suggest that meaning alternatives such as horse and goat only occasionally result in a mixed word finding problem. The number of mixed word finding difficulties experienced by participants in this study seem to exceed the rare exceptions Levelt et al. (2001) concede may exist. When p3 tried to access the word skunk she said the word stunk which seems to have conflated the words stink and skunk. When p2 tried to access the word ball he said gold which seems to be a conflation of goal and cold. These two examples seem to support the premise that parallel activation of two concepts results in a mixed word finding difficulty.

Other more plentiful examples of mixed word finding difficulties identified within the responses to the 21 Snodgrass and Vanderwart (1980) 260 picture set could be divided into two different groups. The group of mixed errors shared both a meaning association and a first sound. p1 said head for heart, p2 said hand for hammer, p3 said harper for horn, p4 said camel for kangaroo, p5 said sleigh for sledge, p6 said suite for settee, p7 said lamp for lightbulb. Participants replaced target words with both more and less frequent words. This suggests that these mixed word finding difficulties could not be attributed to a frequency effect arising at the level of sound processing (Levelt, et al. 1991) alone.

The other group of mixed word finding difficulties identified in the data set were linked because the substituted word shared meaning and the same vowel. p1 said farm for barn, p2 said dog for fox, p3 said tram for pram, p4 said settee for tv, p5 and p6 said hat for cap, p7 said flat for cap. All of these word finding difficulties can be linked to a frequency effect (Levelt et al., 1991) but it is also significant that they are linked because they share a vowel. Bi syllabic words also showed the same pattern of difficulty, p3 said trousers for blouse. Both types of word processing models suggest that sounds in words are assembled and slotted into empty word frames. Levelt et al. (1991) suggest that this process happens incrementally with the first sound being selected before the second and the second sound being selected before the third sound. Dell and O'Seaghdha (1991) are less specific about the order in which sounds are assembled but suggest that sounds are linked to places in an empty word frame.

Both types of model suggest that separating a word into syllables happens when words are matched to sounds. Levelt et al. (1991 p. 5) and Schwartz et al. (2006, p. 229) suggest that sounds and their places within syllables are specified after meaning and word level processing has occurred. It is hard to explain mixed word finding difficulties in which the target word and its replacement share a meaning connection and also the first vowel using Levelt et al.'s (1991) feedforward only theory. This is because the two levels should never, or hardly ever interact. Dell and O'Seaghdha's (2006) model however, which allows additive bidirectional interaction, explains this type of mixed error very neatly and this research project provides some limited support for this kind of model in which different levels of processing can influence each other and the word that is produced is the result of the summation of all of this processing.

4.13.8 *Linking Word Finding Difficulties with Prominent Theories of Word Processing - The Continuity Thesis*

Schwartz et al. (2006) presented their interpretation of Freud's (1953 p.13) belief that PWA experience the same type of word finding difficulties that people without aphasia experience but they just experience them more often. Schuell and Jenkins (1961) also supported this viewpoint and proposed that word finding difficulties were unlikely to be random. Rather, word finding skills represented the underlying integrity of the language system. The most severe forms of aphasia would result in no responses or random word finding and milder forms of aphasia would be less severe and reflect the underlying functioning of the damaged language processing system and would produce meaning or sound differences.

> "As vocabulary breaks down in aphasia, those association processes still intact serve to mediate the errors which appear. At more severe levels of vocabulary deficit, association processes themselves begin to break down, and errors of more remote origin manifest themselves. At the most severe levels of deficit, errors become more irrelevant, finally becoming random or 'no response' errors" Schuell and Jenkins (1961, p. 260)

Furthermore, Schwartz et al. (2006) called this proposition the continuity thesis and suggested that the type of word finding difficulties experienced by PWA could be found on a continuum that stretched between two extremes; random processing that resulted in non-word finding and the other end of the continuum in which specific processing resulted in accurate word finding.

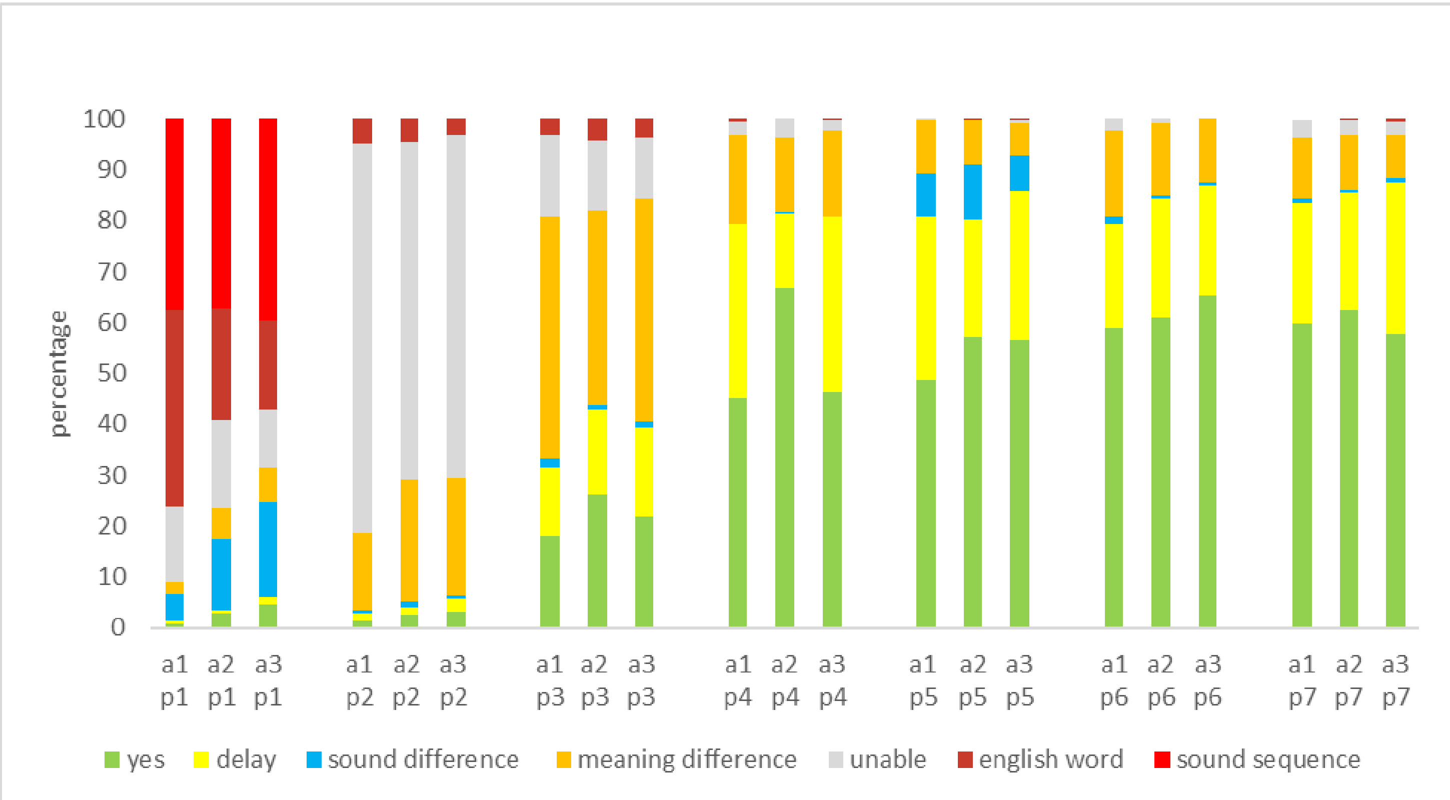
The word finding of the seven participants in this therapy trial corroborates Schwartz et al.'s (2006) view of word finding which has two extremes. Figure 4.3 Percentage Distribution of the Different Word Finding Difficulties Experienced by the Seven Participants in the Three Word Finding Assessments a1 Before Therapy, a2 After Therapy 1 and a3 After Therapy 2 demonstrates the proportion of word finding difficulties experienced by each participant at each stage in the therapy trial.

p1 has the most severe form of aphasia and p7 the mildest form. P7 presents with no random sound sequences whereas p1's word finding is affected quite severely by his inability to find word sound sequences. The only category of word finding difficulty that did not appear to fit into the continuity thesis was the category of sound differences. This category was represented most strongly for the two participants with possible associated Apraxia of Speech (Miller, 2015), p1 and p5 (see Table 4.12 Individual Results Summaries), and it was hardly represented in the word finding samples provided by the other five participants. If word finding difficulties represent a continuum where the most severe difficulties are replaced by less severe difficulties, a person with less severe aphasia should produce more sound finding difficulties than meaning word finding difficulties because accessing difficulties show more resemblance to the target word.

Another factor that might not support the continuity thesis is the no response word finding difficulty category and this is because there may be two very different reasons for this type of response. The first is that the participant with aphasia does not know the word and cannot respond to the picture stimuli at all. The second reason may be that the participant with aphasia recognises that they do not know the word. They then decide that they will not attempt to find a word that they do not know and signal a no response.

Figure 4.3

Percentage Distribution of the Different Word Finding Difficulties Experienced by the Seven Participants in the Three Word Finding Assessments a1 Before Therapy, a2 After Therapy 1 and a3 After Therapy 2



Using Levelt et al.'s (1999) framework this reflexive no response word finding difficulty would arise because of intact self-monitoring that used an intact feedback loop between the output phonological and input meaning processing. This ability to self-monitor should be considered a positive indicator of a participant's ability to use language. There is no way to distinguish why participants in this study responded with a no response word finding difficulty. Nevertheless, the possibility of the self-monitoring induced no response word finding difficulty cannot be reconciled wholly to the continuity thesis as it suggests intact word processing skills not a lack of them.

4.13.9 *Linking Word Finding Difficulties with Prominent Theories of Word Processing - Singular or Plural Processing*

All seven participants showed a word finding difficulty which was apparent in a difficulty with selecting singular or plural grammatical forms of words and all participants showed the same pattern of difficulty accessing singular or plural forms. Words which showed a difficulty with singular and plural selection came from a wide range of categories bike, book, bowl, cherry, clown, crown, ear, handbag, jug, mouse, mushroom, peach, peg, peanut, penguin, sandwich, shoe, and swing. One explanation for this difficulty could be that participants accessed the wrong entry within the meaning representation system. They accessed the plural form instead of the single form of a word because of some difficulty differentiating between their very similar meanings (Dell & O'Seaghdha, 1991).

Another explanation for this difficulty is that these word finding problems occurred because of a difficulty with selection of word grammar. Both word processing theories suggest that the grammatical selection of plural or singular grammatical form happens at level of the word (Levelt et al., 1999; Schwartz et al., 2006). Participants in the study either selected the incorrect meaning representation or the wrong grammatical form of the word they were trying to find. This selection difficulty was apparent for what Levelt et al. (1999) referred to as singular dominant and plural dominant words. A plural dominant noun is one that is usually accessed in its plural form. For example, The British National Corpus (Davis, 2004) suggests that the frequency of the word mushroom is 324 in 100 million words whereas mushrooms is 547. Selecting mushrooms instead of mushroom could be explained by hypothesising P7 had accessed the plural dominant noun that was the most frequent form of the word instead of its less frequent singular alternative.

Following the work of Oldfield and Wingfield (1965) it is widely accepted that frequent words will be accessed more quickly than infrequent words. Plural dominant words would therefore be more readily accessible because they are more frequent and more readily available to PWA who have difficulty accessing words. The model suggested by Dell and O'Seaghdha (1991) would explain the occurrence of plural dominant word finding difficulties by an additive combination of feedforward and feedback processing between the sound and word processing levels. However, Levelt et al. (1999) argue that frequency can influence sound accessing but does not influence word level accessing, as word and sound processing do not overlap, the influence of word frequency cannot be used to account for the selection of plural dominant nouns.

The frequency explanation does not work for the selection of some singular dominant nouns either. For example, P6 accessed ladders instead of ladder. The British National Corpus (Davis, 2004) suggests that the frequency of the word ladder is 1261 in 100 million words whereas ladders is 235. Therefore, it is unlikely that the plural form of the word was accessed because it was more frequent than the singular form. The frequency explanation does not work for all irregular plurals either for example P3 accessed the plural mice that has a frequency of 1009 when the frequency for the singular mouse was far higher at 1728 occurrences per 100 million words. Word finding difficulties in which participants selected a closely associated word also showed evidence of the mis selection of the plural marker. P2 selected shoes for boot and P3 selected lemons for orange and participants also showed difficulty selecting plural grammatical markers for items in the word finding assessments required access to the plural form of the word in words such as grapes and scissors.

5.4% of 2909 words is a very frequent word finding difficulty. Participants in this study used plurals incorrectly 158 times. This word finding difficulty and its prominence within such a large data set has not been highlighted before. Its frequency may suggest that plural processing may not be stored within individual word representations but is actually a syntactic process that is stored independently of word forms. The alternative explanation is not so economical. It suggests that on 158 separate occasions participants selected the incorrect word syntax when they tried to find a noun. This may also include the incorrect activity of more than 158 individual nodes if, as Levelt et al. (1991) suggest, plural dominant nodes have both a singular and plural dominant node to choose from and does not follow Levelt et al.'s (1991) Ockham's razor principle for computer modelling which suggests that any model should work from a minimal set of assumptions. This way of thinking about the way in which PWA produce word finding difficulties that are apparent in mis production of plurality suggests systemic rather than individual item malfunctioning. It seems to suggest that word syntax may be stored as part of the class of nouns rather than as part of individual items. It is noteworthy that neither of the prominent conceptualisations of word processing adequately explain the frequent mis selection of plurality across all people with varying types of aphasia in this therapy trial.

4.14 Word Finding Results Summary

The results of this clinical therapy trial suggest that twelve weeks of activating word representations within the context of a 21 week therapy trial positively affected the word finding skills of the seven participants with aphasia. Stimulating language representations made word finding more accessible to people with aphasia and its impact was long lasting. Behrmann and Byng (1992, p.332) suggested that specific or widespread generalisation of skills acquired in therapy should be considered a good outcome

"Another important measure obtained post-therapy concerns the extent of generalisation – the clinician evaluates whether there has been any transfer from therapy stimuli to other untreated items, modalities, or tasks. While the ideal outcome would be to observe widespread generalisation, even item specific change is an acceptable outcome, reflecting benefit from therapy"

This thesis has argued that the impact of activation therapy is comparable to other word finding studies whose findings have been published in peer reviewed journals and the lack of an equivalent improvement in sentence processing results and non-verbal problem solving assessments also provide support to suggest that improvements could be attributed to therapy rather than a general improvement in brain function.

Statistical analysis suggested that there was no significant difference between the impact of the two types of activation therapy. For the seven PWA in this therapy trial, spoken word finding improved without spoken word finding practice. Despite individual differences, activation therapy with word finding was as effective as activation therapy without word finding at a group level. This direct comparison between two types of therapy which only differ in one aspect, word finding practice, has not been investigated before now. The findings of this study seem to suggest that if PWA think about words and their interconnections within the knowledge system, their word finding will improve without the need for overt spoken word finding practice. This finding particularly relevant for PWA who may not be offered word finding therapy because they cannot talk or repeat words and this thesis has argued that the evidence base to support spoken word finding therapy for people with severe aphasia is very limited.

What is also significant about the results of this study is that the impact of activation therapy was evident in improved word finding for words that had not been used in therapy. This within level generalisation "change to untreated stimuli within the same linguistic level as the focus of treatment" (Webster et al., 2015 p. 1240) suggested that the impact of activation therapy had achieved the desirable but rare outcome for spoken word finding therapy. This thesis has suggested that the Snodgrass and Vanderwart (1980) 260 picture set used in this study should be conceptualised as a fuzzy category of items that share features such as familiarity (Funnell & Sheridan, 1992), concreteness (Warrington 1981) and operativity (Gardner, 1973).

Activation therapy not only supported meaning recruitment and word finding for target therapy items, it also supported meaning recruitment and word finding for words with similar meanings and those that shared similar features (Dell & O'Seaghdha, 1991). It has to be acknowledged that there are limitations to this preliminary and exploratory study which is based on a very small sample of participants and replication of its findings would be desirable to support what has been suggested in this chapter and its summary.

Chapter 5 Grammatical Analysis Results

5.1 Introduction to the Grammatical Results Chapter

Having presented the first set of findings from this research project, this chapter turns to the measurement of the generalisation of word finding therapy to sentence grammar. The findings outlined in the previous chapter suggested that activation therapy helped the word finding skills of the seven PWA in this therapy trial. In the previous chapter it was argued that the differential improvement demonstrated in therapy word sets compared to control word sets and control assessments suggests that activation therapy specific effect on words targeted in therapy and this specific effect provides support for the argument that activation therapy was responsible for improved word finding.

Data collection and data analysis to be included in this part research project was informed by the premise that the most effective therapy extends beyond the skills practised within therapy and will generalise outside of the therapeutic environment. Behrmann and Byng (1992) suggested that the ideal outcome of therapy would be widespread generalisation of therapy skills and Beeson and Robey (2006) described the three outcomes expected from aphasia intervention as: direct treatment effects, generalisation to untrained items and generalisation to connected speech. They suggested that these different outcomes could be considered as hierarchical and Kelly et al. (2012) proposed that these different types of generalisation also reflected increasing levels of difficulty. Pring (2004) extended this argument further and suggests that improved word finding may result in changes in the activity and participation in people with communication difficulties.

It is widely recognised that impairment based therapy should have an impact on everyday communication (Brady et al, 2020; Carragher et al., 2012; Edwards, 1987; Linnik, 2016; Oelschlaeger, 1999; Schuell et al., 1964; Smith, 1985). This is because spontaneous speech is the most common language activity for PWA (Davidson et al., 2003) and conversation is the most important part of human interaction, in which information is exchanged, competence is revealed and social connections are reinforced (Kagan et al., 2004). Even though there is agreement that the impact of therapy should have an impact on functional everyday conversation Carragher et al. (2013) argue that there is very little evidence (Mayer & Murray, 2003; Pashek and Tompkins, 2002) to support generalisation from impairment based therapy to everyday communication.

There is also very little agreement about how to identify whether or not this has happened (see 5.2 Rationale for the Grammatical Analysis Spontaneous Language) and partly this may be because conversation is very difficult and requires the simultaneous integration of linguistic, cognitive and pragmatic integration (Conroy et al., 2009; Mayer & Murray, 2003) for its success. In this context, the difficulty of the task may obscure any cross level generalisation that may be discernible in less demanding contexts (Conroy et al., 2009) such as word finding assessments.

Webster et al. (2015) suggested that whilst evaluating the impact of within level generalisation (generalisation to untreated stimuli) had been addressed systematically across level generalisation (generalisation to another linguistic level not targeted in therapy) had not. They argued that identification of across level generalisation required a specific description of the components of any given therapy, an indication of what across level gains had been achieved as a result of therapy and finally a direct link between across level therapy gains and the therapy that had been provided (Webster et al., 2015 p. 1256). They also argued that researchers needed to make clear predictions about how across level generalisation would manifest and these changes should be measured using reliable and valid outcome measures.

In the current context, where there is no agreement about how to measure across level generalisation (DeDe & Hoover, 2021; Stark et al., 2021), and there is very little evidence about what across generalisation looks like (Beeke et al., 2011), researchers may only be able to provide retrospective rather than prospective statements about what indicators might suggest that across level generalisation has occurred. Moreover, the lack evidence base to support the methods used to analyse spontaneous speech and how to identify whether generalisation has occurred mean that this study is exploratory but it is hoped its findings may add to the evidence base to support future enquiry into what and how to measure the impact of word finding therapy on sentence processing. What remains of this chapter will provide a theoretical context for using grammatical analysis to analyse spontaneous language. It will describe how data were collected and how they were analysed. It will also describe the procedures that were put in place to reduce bias. The chapter will conclude with a discussion that will focus on the theoretical implications of the grammatical results and the way in which the verification interview process enabled people with severe aphasia to contribute to this research.

5.2 Rationale for the Grammatical Analysis Spontaneous Language

The analysis of the language used by people with aphasia is a complex field of study. A review of the literature suggests that there are many different ways to generate language samples: picture descriptions (Yorkston & Beukelman, 1980), story board descriptions, story retelling including Cinderella story retelling (Prins & Bastiaanse, 2004; Nicholas & Brookshire, 1993), describing a procedure (Nicholas & Brookshire, 1993), biographical data (Nicholas & Brookshire, 1993), open and closed topic conversations (Doyle et al., 1995), description of television programmes (Doyle, 1995), semi structured interviews (Hengst et al., 2005), structured interviews, community observations (Hengst et al., 2005) and real life conversations (Oelschlaeger & Thorne, 1999; Rose, 2016).

Furthermore, Armstrong (2000) argued that different elicitation processes should not be collapsed into one single analysis because she suggested that modality, specificity and complexity of stimuli affected response (Shadden et al., 1991). For example, responding to a request for a picture description of the cookie theft (Goodglass & Kaplan, 1983) will produce a different type of response to a request to describe the procedural process of tying a shoelace (Nicholas and Brookshire, 1993). Lesser and Milroy (1993) also suggested that the context of communication can affect the way in which language is used. This is because of, fatigue (Rose et al., 2016), the way in which the conversation is conducted (Doyle, 1995), the topic (Manochiopinig, 1992), the communication partner (Rose et al., 2016, Prins & Bastiaanse, 2004), the degree of shared knowledge (Shadden et al., 1991), whether the topic is factual or evaluative (Armstrong, 2005), the familiarity of the context (Shadden et al., 1991), the purpose of the conversation (Doyle, 1995), the cognitive demands (Doyle, 1995), memory, sequencing and organisational demands (Shadden et al., 1991). All of these factors can affect the way in which a message is conveyed and understood.

Rather than inventing new methods which lacked the refinement of established procedures Linnik et al. (2016) urged researchers to adapt current methods of analysis to suit the analysis of naturally occurring conversations. Given the time constraints imposed on aphasia clinicians, (see 2.2.1 The World Health Organisation and the National Health Service), and its impact on what therapists provide in clinical settings (Cruice et al., 2021), it is important for research to use measures that can be readily transferred into the clinical environment and do not take too much time to administer and evaluate. Interviews were thought to be relevant to elicit data that could be used to measure the impact of impairment-based therapy as they represent a clinically relevant everyday activity that PWA experience when they talk to professionals and conversation partners.

Grammatical analysis is a well-documented way of analysing the spoken output of PWA (Lind, 2009; Edwards & Bastiaanse, 1998; Edwards, 1987; Penn, 1987; Penn & Behrmann, 1986). Authors such as Kim et al. (2019) and Del Toro et al. (2008) also promote the use of methods which are readily transferrable to clinical situations. Grammatical linguistic profiling is a core part of undergraduate and post graduate Speech and Language Therapy training (RCSLT, 2008). All Speech and Language Therapists will have received grammatical analysis training that involves understanding of how to classify words, phrases and sentence structures. In a recent study into the way in which therapists analyse discourse, Bryant et al. (2017) reported that 6.6% of their sample of 106 clinicians already used grammatical analysis to assess the language produced by people with aphasia, albeit only infrequently for the analysis of naturally occurring language.

In contrast to grammatical analysis of language other language analysis procedures require access to specialist equipment and time consuming training that prohibit their implementation (Cruice, 2021). For example, the specialist computer programmes produced by Covington et al.

(2010), Fergadiotis et al. (2013) and MacWhinney et al. (2011) need resourcing and other paper based assessments require time and a degree of specialism to learn and apply some very detailed analytical procedures (Herbert et al., 2013; Nicholas & Brookshire, 1993; Saffran et al., 1989).

In this study the wider impact of activation therapy was measured using accessible and transferrable grammatical analysis of extracts of spontaneous language that had been obtained within everyday semi structured interviews. The analysis addressed the third aim and objective of the research project

Aim 3. To use aphasia therapy experience interviews as a way of evaluating the impact of activation therapy on grammar by

Objective 3: Comparing word, phrase and sentence production in equivalent aphasia therapy experience interview segments

5.3 Therapy Experience Interviews a Combined Grammatical Analysis and Thematic Analysis Data Collection Procedure

Therapy experience interviews were conducted with the seven participants and their therapy trial partners and these interviews created the context for data collection that could be used for both the grammatical analysis described in this chapter and the thematic analysis described in chapter 6. The interviews in this study were conducted at the same time as the word finding assessments, before therapy started (a1), after six weeks of therapy (a2) and after 12 weeks of therapy (a3). Please refer to Figure 3.2 Concurrent Mixed Two Method Data Collection and Three Method Data Analysis Research Design Used in this Activation Therapy Trial for a visual representation of how therapy experience interviews were used to collect data for both grammatical (Crystal, 1982) and thematic analysis (Braun and Clarke, 2006) in this study.

Out of a possible 42 interviews, 2 interviews did not contribute to the data set, this was because ttp4 a2 interview did not take place and ttp5 a3 interview did not record. All other Interviews were recorded using a Panasonic Camcorder and a San Disc memory card. Interviews were recorded using a camcorder even though this choice could be considered more invasive than using an audio recorder but it was important to capture all aspects interaction, both the verbal and non-verbal aspects (Prutting and Kirchner, 1987). At the end of each interview the recording was transferred onto two external terabyte hard drives: one main drive and one back up which were stored in a locked filing cabinet when not in use. Interviews were then available for transcription and subsequent verification processes (CASP, 2020).

All but a handful of interviews were conducted in the same university research room that was approximately 4.5m by 4.5m, an alternative university classroom was used on two occasions and p5's a2 interview was conducted in her own home. Del Toro et al. (2008) suggest that using the same location for research is good because it equalises the variables that might affect the interview process such as unwanted noise, heat or light. During the interviews, the interviewer and the interviewee sat next to each other on typical office chairs, facing each other, and the camcorder was placed opposite them on a tripod six feet away behind an intervening table that was used to hold bottles of water and interview prompts.

As would be expected in a PhD, interviews were conducted by the same person throughout the research project. This could be considered to be a methodological flaw because it introduces bias into the research design (CASP, 2020; Brady et al, 2016). This possible source of bias also introduced some possible advantages over studies which use varied researchers with various levels of experience to interview different participants in a study in which interviewing is the main source of data collection (Campbell et al., 2003; Mumby & Whitworth, 2012). The lead researcher was an experienced Speech and Language Therapist practiced in talking to PWA and conducting interviews. This meant that the interviewing style and approach to supporting communication with PWA was consistent throughout the whole project, a recommendation supported by Del Toro et al. (2008). This continuity also meant that the trust, rapport, authority and involvement between interviewer and interviewee were consistent throughout the project (Moffett, 1991).

Therapy experience interviews were designed to investigate the impact of activation therapy Previous research with a PWA had established that PWA could participate in minimally structured interviews (Bixley & Gilpin, 2009) and this preceding work informed the design of this project. The same semi structured, non-directive interview guide was used in all interviews with participants and their ttps at each of the three stages of the research study, a1, a2 and a3. The ten interview questions are presented in 3.5.3 Therapy Experience Interviews. Interviews with participants and their ttps were conducted by presenting the interview question and giving time for the interviewee to answer. The interview continued until all ten questions had been answered.

The results of previous research (Bixley & Gilpin, 2009) suggested that participants should be advised that the interviewer would not lead the conversation in any way. This allayed any feelings of unease and uncertainty that might arise because the participants were being asked to talk at length with minimal interruption. If participants and their ttps found it difficult to answer the question they had been asked, the interviewer provided general non-specific prompts to encourage further expansion. Prompts were used to ask the participants and ttps to expand on their thoughts, verify meaning or to re-present the interview question. Any conversation initiated by the participants or their ttps was followed up and discussed. Interviews were conducted face to face and individually. No-one but the interviewer or the interviewee was present when interviews were conducted as it was important to find out what each contributor thought themselves rather than gather opinions that might be affected by the presence of another person in the room.

5.3.1 *Co-construction of Therapy Experience Interviews*

In 1995 Charles Goodwin introduced the concept of co-constructed conversation in conversations with PWA. He suggested that a PWA could represent their thoughts and views if their conversation partner enabled them to communicate. Interviews with all participants with aphasia in this study were co-constructed (Goodwin, 1995; Green, 1984; Kagan, 1998; McVicker et al., 2009) using supported conversation techniques when and where required. Co-construction enabled participants to engage with the research protocol and represent their own thoughts (Hopper et al., 2002). The aim of these co-constructed interviews was to allow participants to understand the questions, answer the question and for the participant and the interviewer to arrive at and verify, an agreed mutual understanding of what had been said (Kagan, 1995; McVicker et al., 2009; Olness and Ulatowska, 2011). Participants 4, 5, 6 and 7 were able to represent their own experiences of therapy within these co-constructed therapy experience interviews. Table 5.1 Supported Conversation Techniques used in Participant interviews contains a summary of the techniques that were used to enable participants to take part in the therapy experience interviews. Some of these techniques have been reported as supporting communication in the research literature (Blom Johansson et al., 2012; Brown et al. 2010; Brumfitt and Sheeran, 1999; Kagan, 1995; Simmons-Mackie et al. 2014; Van Der Gaag et al., 2005).

The way in which interviews were co-constructed was also as a result of the way in which participants used pragmatic skills (Holland, 1982; Prutting & Kirchner, 1982) to communicate more information than they could convey through spoken words alone. Table 5.2 The Range of Pragmatic Behaviours used by Participants Within Therapy Experience Interviews (Prutting and Kirchner, 1987) presents a summary of the range of pragmatic functions used by participants in their 21 interviews and these aspects of communicative competence are organised into the classification system produced by Prutting and Kirchner in 1987 which, despite its age, has been referred to as well grounded in theory and a valuable profile for organising subjective clinical observations (Doedens & Meteyard, 2020; Manochiopinig et al., 1992). These behaviours could be described as the way in which the participants with aphasia shared their thoughts about their experiences of participating in this activation therapy trial and they could be viewed as the counterpoint to the supported conversation techniques used by the interviewer.

Table 5.1

Supported Conversation Techniques used in Participant interviews

supported conversation technique	source
forced alternatives	Kagan (1995)
rephrasing	Kagan (1995)
verification of mutual understanding	Kagan (1995)
acknowledged competence by saying I know that you know	Kagan (1995)
write down key words	Kagan (1995)
allowed pauses and conversational space	Kagan (1995)
visual analogue scales as referents	Brumfitt & Sheeran (1999)
multimodal communication including drawings, gestures and facial expressions	Van der Gaag et al. (2005)
using mementoes and referents	Brown et al. (2010)
adapted writing and used large font size	Blom Johansson et al. (2012)
stressed key words	Simmons Mackie et al. (2014)
spoke slower	Simmons Mackie et al. (2014)
highlighted topic change	Simmons Mackie et al. (2014)
altered how language was presented	
echoed back words, phrases, last sentence and recapped information	
chunked words and phrases in sentences	
said the same thing in a different way	
spoke louder	
reduced redundancy in sentences	
reduction in morphological endings	
chose to use more frequent words over less frequent words	
enhanced multimodality communication	
mirrored gestures and said what they represented	
prompted participants to write or use gesture	
modelled use of scales and external referents	
conversation management techniques	
explained what was going to happen and set the scene	
used knowledge about client to guide guesses	
signalled that the interviewer did not understand	
used commentary on what was signalled verbally or non verbally for PWA to accept or reject	

5.3.2 *Verification Interview Process*

Participants 1, 2 and 3 presented with severe aphasia and were not able to generate answers to interview questions because their aphasia was so severe it prevented them from reliably creating propositional language. Enabling PWA with severe aphasia to participate in interviews has always been problematic (Shrubsole et al., 2017), especially when the methods used to elicit the perspective of the PWA are qualitative rather than quantitative (Brown et al., 2010). Berzon et al. (1993), Williams et al. (2006), Kovarsky (2008), Doyle et al. (2013), Cruice et al. (2015) support the position that, where possible, PWA should be able to report their own views about their aphasia and Hilari and Byng (2009i) urged researchers to use methodologies that could include people with severe aphasia.

Table 5.2

The Range of Pragmatic Behaviours used by Participants Within Therapy Experience Interviews (Prutting and Kirchner, 1987)

Communicative Act			Example
Verbal Aspects	1.	Speech act pair analysis	Accepted help
			Finished off other person's sentences
			Gave the other person the conversational floor
			Identified when having word finding difficulties
			Participated in confirmation sequences
			Responded to conversational gambits
			Self-monitored and self-corrected
			Signalling agreement more likely than disagreement
			Understood role in conversation
			Used other person's words in response
			Withheld information from others
	2.	Variety of speech acts	Agreed and negated
			Answers incomplete and inexact
			Asked questions
			Commanded me
			Described, evaluated, expanded, commented on
			Had opinion
			Qualified responses
			Teased me
			Told me off
	B.	Topic	Introduced and changed topics
	C.	Turn taking	Asked for clarification, confirmation, opinion, feedback
			Interrupted me
			Spoke over me
	D.	Lexical selection	Word/phrase/clause searching
			Used synonyms
	16.	Specificity/accuracy	Inaccurate, incomplete or abandoned words, phrases, clauses, conversational turn
			Overuse of favoured words or phrases
	17.	Cohesion	In control of their part in the conversation
			Lost focus of conversation
			Put ideas together
			Remembered conversations
	E.	Stylistic variations	Mimics
			Repeated words to self
			Used automatic sequences to find words
			Used colloquialisms
			Uses metaphors and idioms
			Uses rhetorical devices
Paralinguistic aspects	F.	Intelligibility and prosodics	Disrupted fluency
			Used intonation and emphasis
Non-verbal aspects	G.	Non Vocal aspects	Acted a concept
			Signalled concept through gesture
			Used facial expression
			Used referents
			Used symbolic noise
			Used touch symbolically

Instead of excluding people with the severest form of aphasia from this part of the research process entirely, the research project was designed to overcome the unwelcome inherent communicative barrier of aphasia (Ali et al. 2013; Boyle, 2014; Brady et al., 2013; Hengst et al., 2005; Rose et al., 2016; Shrubsole et al, 2017). The first adaptation was the use of supported communication techniques (Kagan, 1998) and acceptance of pragmatic communication (Prutting & Kirchner, 1987) which has already been discussed in 5.3.1 Co-construction of Therapy Experience Interviews. The second adaptation was the creation of the interview verification process (Bixley et al., 2017) which will be discussed in what remains of this section. The creation of the verification interview process was informed by the way in which grounded theorists create an understanding of an area of interest and then ask for clarification about their constructed understanding by asking the opinions for those who provided the original uninterpreted evidence (Charmaz, 1997).

As described in 3.3 Research Design, there were three assessment sessions in each of the three assessment phases, a1, a2, a3. To ensure that the interview verification process fitted into the therapy trial timeframe, ttp1, ttp2 and ttp3 interviews were conducted in the first session of each assessment phase. These individual interviews were then transcribed and analysed for content statements that related specifically to each interview question (Graneheim & Lundman, 2004). The ten interview questions and the associated ttp statements were then presented to each individual participant for verification. The interview schedule for each assessment phases is presented in Table 5.3 ttp1, ttp2 ttp3, p1, p2 and p3 interview activity in each assessment phase a1, a2 and a3

Table 5.3

ttp1, ttp2 ttp3, p1, p2 and p3 interview activity in each assessment phase a1, a2 and a3

	session 1		session 2 or 3
ttp1	interview	transcription and creation of prompts	
ttp2	interview	transcription and creation of prompts	
ttp3	interview	transcription and creation of prompts	
p1			interview
p2			interview
p3			interview

Each participant’s interview statements in each assessment phase were individual to them and were based on what their ttp had thought they might be thinking. Questions and statements were used as starting points for discussion and participants were asked to respond by signalling the strength of their agreement or disagreement with each of the statement questions. For example, ttp 2’s a3 interview was transcribed and analysed for content before being presented to p2 as spoken questions for her to verify or reject, the content statements for questions 2 and 4 are presented in Figure 5.1 p2’s verification interview questions 1 and 4 and their associated prompts.

Visual analogue (Bond & Lader, 1974; Stern et al. 1997) scales were presented alongside the statement prompts which were presented verbally. Because the views of the advocates have been shown to be different from the views of the PWA (Croteau & Le Dorze, 2001; Cruice et al., 2005; Kinsella & Duffy, 1979; McGurk et al., 2012; Oranen, 1987; Schulz et al., 1988) the scales were used to allow participants to signal the strength of agreement or disagreement with each interviews statement when they could not represent their feelings and thoughts themselves. An example of the scales used in this study is presented in Figure 5.2 Verification Interview Visual Analogue Scale

Figure 5.1

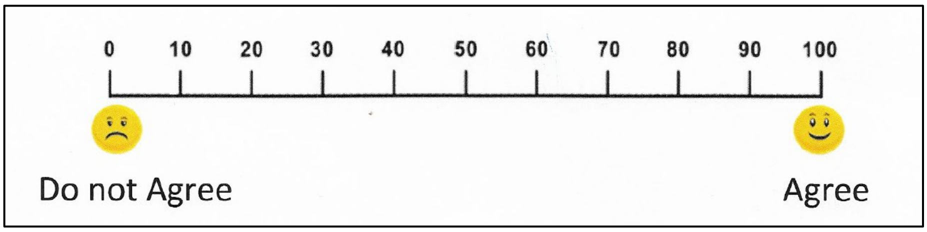
p2’s Verification Interview Questions 1 and 4 and Their Associated Prompts

1 Tell me about your experience of working with me on this trial
a. enjoyed it
b. looks forward to coming
c. she’s enjoyed rather than sitting there listening to yourself speak
d. enjoyed doing this more than the previous stuff
e. communication definitely definitely help in that respect

4 What is important to you?
a. family
b. Mum
c. dad
d. kids
e. home
f. cookery
g. tellie
h. that’s the main thing communication

Figure 5.2

Verification Interview Visual Analogue Scale



The premise behind the verification interview is that aphasia affects everyone who has contact with the PWA. It is highly likely that the people closest to the person experiencing aphasia are likely to be able to add to the understanding of issues that might be of important to the person experiencing language loss. The verification interview allows people with severe aphasia to use the concepts introduced by their ttp and because PWA are able to communicate better than they talk (Holland, 1991) and interact more effectively than their linguistic difficulties might predict (Fucetola & Connor, 2015; Ulatowska and Olness, 2007), this adaptation may allow them to represent their thoughts about the process of undergoing aphasia therapy.

5.4 Grammatical Analysis and Thematic Analysis Interview Transcription Procedure

The 40 interviews provided by the seven participants and their therapy trial partners at each assessment phase were transcribed in full by the researcher. At the end of the transcription process, the complete 40 interview data set contained 698.75 minutes of data, 11.64 hours of data, in which 91,158 words were used within 7801 conversational turns which were organised into 10611 lines and 212 pages of interview transcription. Transcriptions labelled each line of transcript in four ways, participant or ttp, assessment (a1, a2 or a3), line number and lastly, who was talking, the participant, ttp, or the interviewer. This specific level of data labelling enabled the analyst to organise, locate and trace individual extracts of data with relative ease.

Orthographic transcription of participant interviews noted all modalities of verbal communication. Grammatical analysis only included the analysis of spoken language (Crystal, 1992). Even though grammatical analysis focussed on spoken output all transcriptions included details about written communication, gestural communication and symbolic noises. These non-vocal communications were transcribed within brackets to signify that they were communicative acts even if they were not spoken aloud. This level of detailed transcription of multimodality communication is recommended by both Braun and Clarke (2006) and Poland (2002) and has a specific relevance for transcribing the language of PWA where multimodal communication is sometimes the only way to give and receive a communication.

Transcription followed Poland's (2002) position that punctuation should not be used. He argued that punctuation affected meaning and viewed punctuation as part of the process of interpretation rather than transcription. Another decision made about the process of transcription was to count a conversational turn from the moment a speaker started talking until the speaker had finished talking. This is in line with other research such as that conducted by Boles and Bombard (1998) and Kennedy et al. (1994) who defined length of utterance in this way. An example of the transcription taken from p5's a2 interview is presented in Table 5.4. Example of Transcription taken from p5's a2 Interview. Within interviews proper names, nouns with descriptors, references to specific people, places or activities were replaced when they made individual research participants identifiable. Other than taking this precaution, transcriptions were exact.

Table 5.4

Example of Transcription taken from p5's a2 Interview

a1/a2/a3	line	speaker	transcription
a2	67	interviewer	what's life like now
a2	68	p5	it's better because the words um sometimes I can do them and sometimes I can't
a2	69	interviewer	ok and that's better
a2	70	p5	no but it's better than not go going anywhere getting somewhere
a2	71	interviewer	right so you feel therapy's getting you somewhere
a2	72	p5	Yeah
a2	73	interviewer	what's it doing you were saying is it getting more words
a2	74	p5	yeah uh but people don't always have the patience so I can't because people can't
a2	75	p5	understand um they they don't don't um
a2	76	interviewer	because people don't understand people they don't
a2	77	p5	(playfully taps interviewer's hand to signal hold on)
a2	78	interviewer	shut up shut up
a2	79	p5	(laughs) I know that word
a2	80	interviewer	you know what you are going to say I'll shut up then I thought you'd forgotten it then
a2	81	p5	no I haven't um they haven't be they haven't got the patience to to do it
a2	82	interviewer	to talk with you
a2	83	p5	yeah

5.4.1 *Methodological Considerations for Grammatical Analysis of the Therapy Experience Interviews*

At present there is no standard way of using semi structured interview data to measure outcome (Rose et al. 2016) and Rose et al. (2016) suggested that any language analysis needs to overcome the natural variability and versatility of language. What follows provides a detailed description about the choices that were made to within this research project to address the many methodological problems that challenge the stability, reliability, and validity of measuring spontaneous language use; McCarthy and Jarvis (2010) suggested that parts of a language sample should demonstrate different levels of linguistic diversity. The language used at the beginning and end of conversations is usually formulaic and contains overused automatic social language sequences that represent a restricted range of language use. Crystal (1982), Silvast (1991) and Kennedy et al. (1994) advised researchers to avoid analysing the beginning and closing language sequences used during a typical conversational encounter and for this reason, where possible, samples were taken from the hundredth word onwards.

Boles and Bombard (1998) and Fergadiotis et al. (2013) suggested that any language sample should be representative of the whole and therefore a representative language sample should encompass the way in which PWA actually communicate. This means that language samples should include word finding difficulties, use of stereo typical phrases, comments on the task, and repetitions. Some authors such as Saffran et al. (1989) recommend that these characteristic parts of aphasia are removed from the sample before analysis begins. However, this means that the core difficulties experienced by PWA when they communicate are removed from the analysis and by their removal, render the analysis unrepresentative.

Del Toro et al. (2004) highlighted that language samples need to be equivalent if they are going to be used to measure outcome. Fletcher (1985) suggested that ensuring that language samples were comparable could not be achieved by matching the number of utterances or imposing a time limit. This is because length of utterance and the time taken to articulate it vary from person to person and this is especially true for people with aphasia (Hazamy & Obermeyer, 2019). In addition to the need for language samples to be representative and comparable, language analysis needs to be feasible. Language analysis is a time consuming technique and this is particularly true for the transcription of language use for people with aphasia (Kim et al. 2019). Mayer and Murray (2003) reported that only 68 words were elicited in ten minutes of communication with a person in their study. Furthermore, Boles (1998) suggested that each minute of conversation takes at least six minutes to transcribe and 21 to 40 minutes to analyse. There is clearly a challenge to balance the need for language samples to be representative, equivalent, and feasible, especially if research hopes to be transferable and clinically relevant.

Boyle (2014), Malvern and Richards (2002), Meyer and Murray (2003), Nicholas and Brookshire (1993), Oelschlaeger & Thorne (1999), Prins and Bastiaanse (2004), Vermeulen et al. (1989), and Hess Sefton and Landry (1986) decided that a sample of 300 words would satisfy these competing challenges. However, as Fergadiotis et al. (2013) pointed out, not all people with aphasia are capable of producing 300 words. This was true for two of the participants with severe aphasia in this trial. p1's initial interview was 103 words long and lasted 17 minutes and 41 seconds and p3's initial interview contained 204 words and was 24 minutes and 20 seconds long. One option would be to leave these interviews unanalysed as they did not achieve the 300 word inclusion criteria. However, as Cruice (2014) and Linnik et al. (2016) highlight, it is important that people with severe aphasia are represented in research about aphasia. Boyle (2014) encountered a similar problem in her research involving 12 participants and overcame the challenge by including all samples, even those that did not reach the 300 word threshold. This precedent was adopted in this study and to ensure like was compared to like, identical length language samples from a1, a2, and a3, were compared for p1 and p3. The length of the initial samples obtained from p1, p2 and p3 dictated the length of subsequent samples to ensure parity between samples taken at different assessment points. Whilst, where it had proven possible, 300 word samples were used to compare language samples for the other five participants.

In addition to a lack of consensus about how much data to elicit, as Del Toro et al. (2008) point out, there is also very little agreement about how to analyse language samples after they have been elicited and transcribed. There is no standard quantitative measure (Beeke et al., 2011). Language analysis at or below the level of the sentence has been conducted in many different ways, for example, looking at the number of words (Doyle, 1995; Oelschlaeger & Thorne, 1999), number of content units (Yorkston & Beukelman, 1980), noun and verb production (Boyle, 2014; Rose et al., 2016), percent of different types of word classes (Mayer & Murray, 2003), noun and pronoun ratios (Bird & Franklin 1996; Saffran et al., 1989), type token ratio/lexical diversity (Fergadiotis & Wright, 2011; Gordon, 2008; McCarthy & Jarvis, 2010; MacWhinney et al., 2011; Nicholas and Brookshire, 1993), proportion of closed class words (Berndt & Haendiges, 2000; Saffran et al., 1989), heavy and light verbs (Bastiaanse et al., 1996), T units (Boyle, 2014), predicate argument structure (Cruice et al., 2014), linguistic profiling (Edwards, 1995; Crystal, 1982), mean length of utterance (Del Toro et al., 2008), and lastly mean length of turn (Hengst et al., 2005).

There is also the additional difficulty of deciding whether to measure what language is used or whether to look at how language is used. In other words, whether or not to investigate how language is being used and whether or not the person using it is conversationally competent. This could encompass focussing on the pragmatics (Prutting & Kirchner, 1987) of language use such as turn taking (Doyle, 1995; Prutting & Kirchner, 1997), cohesion and topic shifting (Andreetta & Marini, 2015; Doyle, 1995; Prutting & Kirchner, 1997; Sherratt, 2007), conversational repair (Beeke et al. 2003), and use of communicative functions (Doyle, 1995; Hengst, 2005; Jakobson, 1990; Prutting & Kirchner, 1997), correct information units (Nicholas & Brookshire, 1993) and finally utterances containing new information (Del Toro et al., 2008; Doyle et al., 1995). This very short summary of the methods available within this field of study demonstrates that there is very little agreement about the best way to measure spontaneous language and also how to use language to measure outcome. However, that it is relevant to measure it, is evident in the attention that it has received over the last few decades. The way in which the spontaneous language was analysed in this research project is presented in the next part of this chapter.

5.4.2 *Mechanics of Grammatical Analysis*

Data from all seven participants contributed to grammatical analysis. After each interview had been transcribed, each interview was transferred onto an Excel spreadsheet for analysis. Each conversational turn was placed onto a new row and started when a speaker started to talk and ended when the speaker stopped talking. This is in line with other research such as that conducted by Boles and Bombard (1998) and Kennedy et al. (1994) who defined length of utterance in this way. After each interview had been transferred onto an excel spreadsheet interviews, where possible, were truncated into 300 comparable segments. The extracts started on the one hundred and first word and ended on the four hundredth word. For extracts that did not reach 300 words, the first interview dictated the length of subsequent comparable extracts and interview extracts were counted from the first word onwards (Boyle, 2014), even though the first part of these interviews might reflect stereotypical language (McCarthy and Jarvis, 2010), this might represent a strength for someone with severe aphasia who was only able to access 103 words in his first interview.

Turns were analysed using the three main categories used by Crystal (1982) word, phrase, and clause level structures. Word level analysis involved coding each word into one of the 11-word class categories used by Leech et al. (2009) in the British English 1961-1991 one million word analysis of written English, adjective, adverb, article, conjunction, determiner, miscellaneous, noun, numeral, preposition, pronoun, and verb. Phrase level analysis coded phrases into adjective, adverb, noun, preposition and verb phrases. It also included recording the length of multiword phrases. Finally, clause level analysis divided structures into subject, verb, object, adverb, relative clause and subordinate clause level codes (Crystal, 1982).

Table 5.6

Example Grammatical Structural Analysis of a 14 Word Sentence Produced by p5 in a3

word	class	phrase	phrase length	clause	utterance length
yeah	excl				14
yeah	excl				
um	excl				
whe	un				
when	adv	advp		asvo	
I	pro	np			
get	v	vp			
get	v				
my	pro				
speech	noun	np	np2	subordinate	
back	part		vp2		
it	pro	np		svc	
be	v	vp			
better	adv	advp			

Note. excl = exclamation, un = unable to analyse, adv = adverb, pro = pronoun, v = verb, part = verb particle, advp = adverb phrase, np = noun phrase, vp = verb phrase, advp = adverb phrase, asvo = adverb subject verb object, svc = subject verb complement.

Utterances were analysed vertically rather than the more typical horizontal hierarchical tree structure analysis format that is usually used for linguistic analyses. Vertical analysis was used so that coding could be stored in columns that subsequently could be analysed using the excel pivot table function. Table 5.6 Example Grammatical Structural Analysis of a 14 Word Sentence Produced by p5 in a3, demonstrates the way in which a 14 word utterance produced by p5 in a3 was analysed according to this procedure.

5.5. Grammatical Statistical Analysis

Comparable extracts taken from a1, a2 and a3 interviews were compared to see if activation therapy had a measurable impact on participants' use of grammar in spontaneous speech. Non parametric assessments were used to analyse the sentence structure results because they can be used to examine the impact of activation therapy on a small amount of people. Having such a small group of participants threatens the assumption of normal distribution that is required to use parametric assessments, see 4.6 Single Word Processing Statistical analysis for a fuller justification of the use of non-parametric assessments to evaluate the impact of therapy.

The Wilcoxon Signed Ranks Test was used to evaluate the change in participant scores. There is little or no evidence to suggest that word finding therapy will have a beneficial impact on sentence structure so all statistical analyses were two tailed and the Bonferroni correction was not implemented because of the primarily exploratory nature of the study (see 4.5 Multiple Statistical Analyses for a detailed argument to support this decision).

5.6 Grammatical Analysis Results

Comparable a1, a2 and a3 interviews from all seven participants were coded and compared to see whether there were any changes in language use over the course of the therapy study and address the third aim and third objective of the study

Aim 3. To use aphasia therapy interviews as a way of evaluating the impact of activation therapy on grammar.

Objective 3: Comparing word, phrase and sentence production in equivalent aphasia therapy experience interview segments

First, comparable a1, a2 and a3 data extracts were compared to see if there had been any change in the way that the seven participants used each of the 11 classes of words categorised by Leech et al. (2009). The raw data for these calculations are presented in Appendix 13 Proportion of Word Categories Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase. The Wilcoxon Signed Ranks Test used to compare the use of each word class on each assessment occasion suggested that there was no statistical difference between the proportion of each different type of single word were used before or after therapy. More specifically, after twelve weeks of activation therapy, the proportion of nouns used by each participant did not change from a1 to a3.

Grammatical analysis of phrase structure was also compared and the proportions of different phrases used in each assessment phase were analysed to see if activation therapy had affected the number of different types of phrases that participants used. The raw data for these calculations are presented in Appendix 14 Proportion of Phrase Types Produced by Each Participant in Equivalent

Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase. Statistical analysis using The Wilcoxon Signed Ranks Test suggested that there was no difference between the way that participants used different types of phrases before therapy had started and after they had received twelve weeks of activation therapy.

Phrase length was also compared before and after therapy. The raw data for this comparison is presented in Appendix 15 Longest Type of Phrase Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase. When phrase lengths produced in a1 were compared to the length of phrases used in a3, there was one phrase level indicator that was statistically different before and after therapy and this was the length of noun phrase. Moreover the effect size was large (Cohen, 1988). The results of the statistical analysis are presented in Table 5.7 Wilcoxon Signed Ranks Test Used to Compare the Longest Noun Phrase Produced by each participant in a1 Before Therapy Interviews with a3 After Therapy Interviews. This significant result, from this exploratory study, suggests that activation therapy had a significant impact on the noun phrase length production of the seven participants in this small scale therapy trial. Following activation therapy, they were more likely to produce longer noun phrases than before therapy had begun.

Table 5.7

Wilcoxon Signed Ranks Test Used to Compare the Longest Noun Phrase Produced by each participant in a1 Before Therapy Interviews with a3 After Therapy Interviews

variable	median a1	median a3	Z	2-tailed	effect size
noun phrase length	2.00	4.00	-2.401	0.02	0.91

Note: Cohen's (1988) effect sizes = Z / √number of comparisons 0.1 small, 0.3 moderate, and 0.5 large.

Clause level production was also compared to see if there was a difference in the way that clause level structures were used between the different assessment phases. The raw data for these analyses is presented in Appendix 16 Clause Level Raw Data Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase. Statistical analysis using the Wilcoxon Signed Ranks Test suggested that there was no statistical difference between the way that participants produced clauses when a1 production was compared to clause level production in a3.

Comparable interviews extracts were also examined to evaluate the impact of the two types of activation therapy. One analysis suggested that the two types of activation therapy had a different impact on language production. This analysis looked at the impact of the two types of therapy on all types of phrase production, on words that can stand alone as phrases, albeit agrammatical phrases, or words that combine with others into a phrase. The raw data for this analysis is presented in Appendix 17 Proportion of Phrases Produced After activation therapy with Word Finding and Activation Therapy Without Word Finding Sessions in Equivalent Extracts Taken from Therapy Experience Interviews Conducted After Each Type of Therapy with Each Participant. The Wilcoxon Signed Ranks Tests are presented in Table 5.8 Wilcoxon Signed Ranks Test Used to Compare Phrase Production After Activation Therapy with Word Finding with Phrase Production After Activation Therapy Without Word Finding. This result seems to suggest that activation therapy without word finding has a positive effect on the number of words classified as phrases produced by the seven participants in this therapy trial and the effect size suggests that it is a large effect (Cohen, 1988), Whereas activation therapy with word finding did not affect the way that participants used phrases in a similar or significant way.

Table 5.8

Wilcoxon Signed Ranks Test Used to Compare Phrase Production After Activation Therapy with Word Finding with Phrase Production After Activation Therapy Without Word Finding

total phrase production	median before	median after	Z	2-tailed	effect size
after activation therapy with word finding	53.33	48.33	-0.135	1	n/a
after activation therapy without word finding	51.67	53.33	-2.366	0.02	0.9

Note: Cohen's (1988) effect sizes = Z / √number of comparisons 0.1 small, 0.3 moderate, and 0.5 large.

5.7 Procedures used to Reduce the Possible Impact of Bias, Grammatical Analysis

Brogan et al. (2020), Kladouchou et al. (2017) and Tate et al. (2008; 2013) suggest that inter rater reliability checks were one way of addressing and measuring the risk of bias in research designs which included detailed analysis of case study data and although there are no precise benchmarks about what this means (Kazdin, 2011). Kratochwill et al. (2013) suggested that checks should be made on 20% of data and achieve an agreement of 80%. In this study, the researcher and a Speech and Language Therapy Frontrunner, independently analysed each of the 21 participant interviews grammatically at word, phrase and clause level. Then analyses were compared by the lead researcher for inter rater reliability scores using Nicholas and Brookshire (1993) formula for calculating inter rater reliability (agreements / agreements and disagreements X 100 Nicolas and Brookshire 1993). This method was supported more recently by Hallgren (2012).

For the grammatical analysis inter-rater reliability checks recommended by authorities such as the Cochrane Review, Brady et al, 2016, CASP, 2020, TIDieR, Hoffmann et al, 2014, CONSORT, Moher et al, 2010 and SCED, Tate et al, 2008 were conducted for the total number of words used by all participants, word class classification for all participants and the length of noun phrase for all participants. The agreement for the number of words in each interview was 99% (18004 words and 17892 words – difference of 112 words). The agreement for classification of each word into each word class overall was 89% agreement. Agreement for individual participants ranged from 100%, p1 to 87% for p5 (p2, 93%, p3, 93%, p4 90%, p6 92% and p7 89%). Finally, interrater reliability for the length of noun phrase at each stage of the project was 100%.

5.8 Grammatical Results Discussion

In this preliminary and exploratory research study, the detailed grammatical exploration, of the 91,158 words that were used by all seven participants within their 21 therapy interview experience interviews found two indicators which were used in a significantly different way before and after participating in activation therapy. The first of these was that noun based activation therapy appeared to have a significant impact on the length of noun phrases. This positive change in noun phrase length is attributed to twelve weeks of activation therapy because the three measures used as within subject controls did not show a commensurate increase in function (The no therapy word finding control group; The Test for the Reception of Grammar 2, Bishop, 2003; The Standard Progressive Matrices, Raven, 2006). After twelve weeks of activation therapy the seven participants in this study used more complex noun phrases. They were able to complement noun accessing by producing them with other associated word classes such as articles, determiners, adjectives, and numerals. These additions occurred in the context of no observable overall increase in noun production.

Finding an increase in noun phrase length is a desirable outcome and relevant to aphasia therapy which as Linnik (2016) suggests has made very slow progress at identifying how to measure the impact of therapy on discourse production over the last 15 years. Dietz et al. (2018) called for creative solutions to the problems that prevent therapists using discourse analysis in clinic and they cite Kintz and Wright (2018) when they suggest that discourse analysis may hold the key to identifying the specific impact of therapy on naturally occurring conversation. Noun phrase length is a very simple indicator to identify. It could be collected by therapists during everyday therapy interviews without the need to record and transcribe lengthy interviews. Kim et al. (2019) suggested that, identifying an easy discourse indicator that is not time consuming to use, would be very desirable and Bryant et al. (2017) suggested that clinical discourse measurement needs to overcome the twin barriers of knowing how to do it and having the time to do it (Cruice et al., 2021). It is perhaps ironic that the traditional structural grammatical analysis used in this project has identified that noun phrase length may be a clinically possible indicator of change and it may be relevant for further enquiry into how to use discourse as a way of measuring outcome.

Attributing these positive findings to attending a course of activation therapy is problematic as change could be attributed to the positive generalised benefits of attending a prolonged course of activation therapy (Pritchard et al., 2018) or identifying generalisation because of using multiple statistical tests which might find differences between two sets of data by chance (Webster et al. 2015). The first premise is addressed in detail in 6.5 Different Possible Interpretations for the Positive Impact of Attending the Activation Therapy Trial and the second in 4.5 Multiple Statistical Analyses. However, the results of this unique project incorporating grammatical analysis of interview data suggests that PWA have activation therapy may have a specific effect on the length noun phrase accessing. The specificity of this findings add weight to the argument that activation therapy was responsible for these changes, as does the lack of significant change in any other grammatical or control measure and as with any exploratory study, its findings are preliminary and require replication.

The second indicator that participants used in a significantly different way after activation therapy was measurable only after six weeks of activation therapy without word finding therapy. When the quantity of phrases before and after activation therapy without word finding were compared, there was a significant increase in the number of phrases used. This difference was not apparent after activation therapy with word finding. This difference suggests that activation therapy without word finding had an effect on phrase production by reducing the number of words used that could not be incorporated into phrase structure. Words such as exclamations, fillers such as um, incomplete words, and yes and no responses were all less likely to occur after activation therapy without word finding and were replaced by one of five phrase structures either adjective, adverb, noun, verb or prepositional phrases. Meaningful words replaced words that had less meaning. This finding is also unique. It is also relevant that the therapy that resulted in this measurable change in such a small sample size was the therapy that did not involve overt word finding practice and somehow activation therapy without word finding improved access to phrase structure grammar. Further investigation into the impact of activation therapy with and without word finding would add clarity to its impact on the use of meaningful language in spontaneous speech in interviews.

5.8.1 *Word Class*

Statistical analysis of the way in which participants used the different word classes (Leech et al.'s, 2009) did not identify any measurable changes in accessing words after activation therapy. Activation therapy with and without word finding was directed at enhancing noun word finding and noun word finding therapy did not impact on noun finding in sentences or in discourse. The raw data about the proportion of words within Leech et al.'s (2009) 11 word classes accessed by each participant within each assessment phase are presented in Appendix 13 Proportion of Word Categories Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase. This lack of impact is in line with previous research which has failed to find a direct link between noun production therapy and noun production in unconstrained language tasks (Rider et al., 2008).

One reason for the lack of impact can be explained by the notion that we do not know what normal word finding within a semi structured interview would look like. There are no established reference points such as those available for picture description or procedural narratives (Nicholas & Brookshire, 1993). As Carragher et al. (2012) suggest, the aim of impairment based therapy is to transfer its success in therapy to real life conversations. Cruice et al. (2014), Del Toro (2000) and Shadden (1991) suggest that without an idea of what they refer to as typical language within a semi-structured interview it is difficult to identify what constitutes, what Rose et al. (2016) describe as, meaningful change. One way of overcoming this problem would be to analyse the semi structured interviews that were conducted with the ttps in the same grammatical way as the interviews with the participants were analysed. However, this option was outside the scope of this research project.

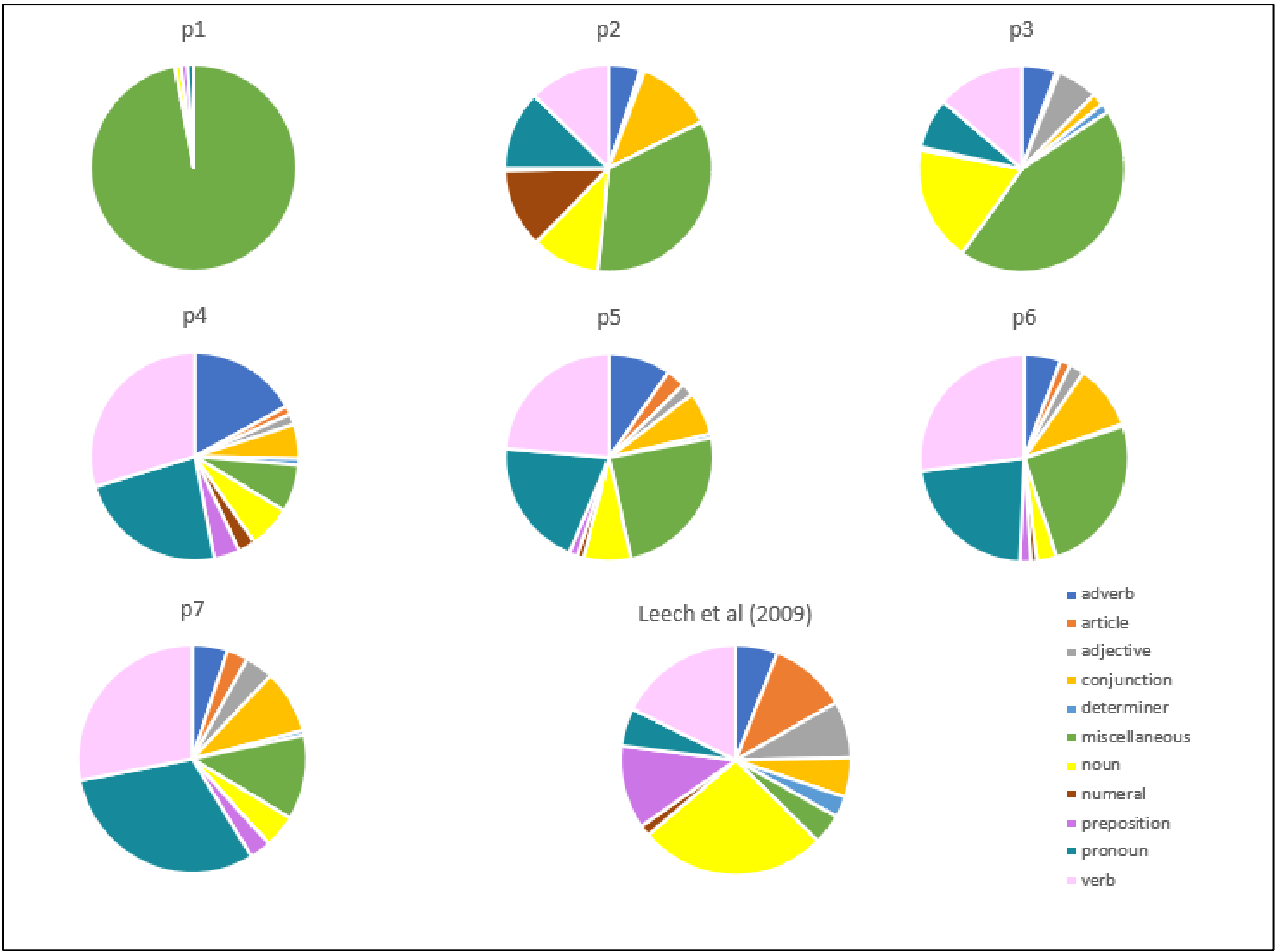
Another way comparing the language produced by PWA with the language produced by people without aphasia is to compare them to a well-respected collection of typical language use. The Leech et al.'s (2009) corpus of over one million words provided a way to compare the language produced by the seven participants in this trial with language produced by people without aphasia. The corpus is based on mainly written twentieth century communication and sorted words used in English into the 11 word classes used in this study.

When the proportion of each type of word produced by the PWA in this trial was compared to the proportions of word types used within Leech et al.'s (2009) one million word, analysis suggested that the two groups did indeed use language differently. P1's communication was almost entirely composed of miscellaneous language. p2, p3, p4, p5, p6, and p7 used proportionally more pronouns and miscellaneous words such as exclamations. All participants used fewer nouns, articles, adjectives, and prepositions and it is noteworthy that the six participants' use of the other word classes did not show a consistent pattern. p4 was able to access determiners in the same way as they were used in Leech et al.'s (2009) sample but all of the other participants had difficulty accessing this class of words.

This analysis suggests that for this limited sample of seven people with aphasia, it seems that there is particular difficulty accessing nouns and this difficulty is also apparent for other word classes that are associated with noun phrase production. Raw data for this analysis is presented in Appendix 18 Participants' a3 and Leech et al. (2009) proportion of word use and pie charts representing the word class distributions for each participant are presented in Figure 5.3 Eight Comparable Pie Charts Showing the Way in Which Each Participant Used Each Word Class and the Way in Which People Without Aphasia Used The Different Word Classes in Leech et al.'s (2009) Million Word Corpus, which also shows the word class distribution in Leech et al.'s (2009) million word corpus. These pie charts show how different the samples collected from the 7 PWA are compared to Leech et al.'s (2009) corpus and highlight the persistent problem that PWA have accessing nouns, articles, adjectives, and prepositions.

Figure 5.3

Eight Comparable Pie Charts Showing the Way in Which Each Participant Used Each Word Class and the Way in Which People Without Aphasia Used The Different Word Classes in Leech et al.'s (2009) Million Word Corpus



Hazamy and Obermeyer (2020) suggested that identifying what commonalities people with all types of aphasia have when they talk discursively is important. One part of the discussion about the way in which PWA use different word classes has focussed on the way in which people with different types of aphasia use language in different ways. Gordon et al. (2008) reported a problem with pronoun accessing for the eight people with non-fluent people aphasia in their picture description research project. In this research project, all of the participants apart from p1 who had difficulty accessing any single words, used pronouns more frequently than they were used in the Leech et al. (2009) corpus suggesting that the participants in this trial, with different degrees and of aphasia presentations, did not show problems accessing pronouns.

Armstrong (2000) agreed with the commonly held view that people with non-fluent aphasia would use more nouns than verbs (Goodglass & Kaplan, 1983) and Berko Gleason et al. (1980) proposed that people with fluent aphasia would use more verbs than nouns (& Kaplan, 1983). The results of this study suggest that the 7PWA in this trial had a significant difficulty with accessing nouns and this was evident irrespective of their type of aphasia. These findings closely align with research by Cameron et al. (2010), Cruice et al. (2014), and Bird & Franklin (1996) which suggested that verb accessing impairments in people with fluent and non-fluent aphasia were indistinguishable. It is noteworthy that the way in which the seven people with fluent and non-fluent aphasia have difficulty finding noun phrase constituents is also indistinguishable and they do not adhere to the commonly held view that people with different types of aphasia have different kinds of word finding difficulties.

5.8.2 *Lexical Diversity*

Another area of interest for those who research into the discourse of PWA is lexical diversity and whether changes in lexical diversity can be used to measure the impact of therapy (Boyle, 2014; Fergadiotis et al., 2013; Gordon, 2008; Herbert, 2008; McCarthy & Jarvis, 2010; MacWhinney et al., 2011; Nicholas & Brookshire, 1993). When the amount of different words used by participants in a1 assessments were compared to the number of different words used in a2 and a3 assessments, analysis suggested that there was no measurable change in lexical diversity over the course of the therapy trial. The raw data for this analysis is presented in Appendix 19 Percentage of unique words used by each participant at each assessment point. In the same way that activation therapy did not impact on noun accessing, it had no measurable effect on the number of different words participants accessed in their equivalent samples. It may be that lexical diversity does not reflect language competence in spontaneous language production and should not be used to measure the impact of therapy. Covington and McFall (2010), Hess, Sefton and Landry (1986), Malvern and Richards (2002), Richards (1987) argue convincingly that lexical diversity is affected by sample length.

McCarthy and Jarvis (2010) also argue that context affects linguistic diversity. They used two sentences from Lincoln's Gettysburg Address (1863) to illustrate their point. The sentence "of the people, by the people, for the people" would have a linguistic diversity of 56% and the sentence "have a new birth of freedom and that government" would be 100%. That the same person produced two sentences with very different proportions of lexical diversity within the same speech illustrated their point, that lexical diversity should not be used to infer absence or presence of language skills. Rather language is used in different ways depending on the context of its use rather than the competency of its user.

5.8.3 *Clause level*

The raw data for clause level analyses are presented in Appendix 16 Clause Level Raw Data Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase. Clause level analysis did not show any significant differences between assessments conducted in a1 and a3. It did however suggest that the most frequent clause structure used by 6 of the 7 participants was SV – subject verb. The only participant who did not use SV structure was participant 1 who produced no clause structures at all. SV clause structure occurred in 17/18 remaining interview transcripts. One interview conducted with p3 in a2 assessments demonstrated that SVO and VA were the most frequently accessed clause structure in her interviews but when she was reassessed in a3 interviews this difference was no longer apparent. SV clause structure was observed in participants with fluent and non-fluent aphasia and in participants with different degrees of aphasia. This finding argues against the notion supported by researchers like Goodglass and Kaplan (1983) and Berko Gleason (1980) that people with different types of aphasia have different types of access to clause structure. This very limited sample of people with different types of aphasia suggests that they all have difficulty creating sentence structure and this is reflected in short sentences which typically contain a subject and verb.

5.8.4 *Interviews*

As argued in the introduction to this chapter (5.1 Introduction to the Grammatical Results Chapter) there is no consensus about what across level generalisation might look like (Beeke et al., 2011; DeDe & Hoover, 2021; Stark et al., 2021). This is despite the theoretical possibility of impairment based therapy having an impact on functional communication (Brady et al, 2020; Carragher et al., 2012; Edwards, 1987; Linnik, 2016; Oelschlaeger, 1999; Schuell et al., 1964; Smith, 1985). Currently we do not understand enough about how people with and without aphasia communicate within interview settings (Cruice et al., 2014; Del Toro, 2000; Hazamy & Obermeyer, 2020; Shadden, 1991) to be able to understand what aspects of sentence processing and interview language might be affected by aphasia and changed as a result of impairment based therapy (Webster et al., 2015).

The Fourteen sets of interviews produced at each assessment point, a1 a2 and a3, conducted with from the 7PWA and their 7ttps were transcribed. All but two interviews recorded and these were from the a2 interview with ttp4 which did not take place and the a3 interview with ttp5 that did not record. Each of the 40 interview scripts was analysed for length of interview, number of words, number of conversational turns and mean length of turn. These analyses can be found in Appendix 20 Interview Analyses Participants, ttps and Interviewer, Time, Words and Mean Length of Utterance.

Analysis provided support for the notion that conversations with PWA take more time than conversations with people without aphasia. In these participant interactions the interviewer used more words and more conversational turns. Participants used more conversational turns than their ttps and their conversational turns were shorter. These differences were the same in a1 and a3 interviews. These results suggest that the researcher adjusted the way in which interviews with PWA were conducted to help them interact and this adaptation includes using more words and conversational turns to accommodate the difficulty that PWA have with spontaneous language use.

5.8.5 *Verification Interview Process*

Conversations with PWA need to be co constructed. The interview verification process that was put in place for p1, p2 and p3 who were all living with severe aphasia (Goodglass & Kaplan, 1983) seemed to enable them to represent their own opinions. Listening to the views of ttps alone could not be representative of participants with aphasia as research by Williams et al. (2006) identified that proxy ratings only have modest agreement with the ratings of people with aphasia themselves. In this research project proxies were asked questions about what they thought their partner with aphasia might say if they had the language to express their thoughts. These conjectures were then used as springboards for partners with aphasia to react to by agreeing with the thoughts already elicited from their ttps or disagreeing with them. The verification interview process was thought to be a pragmatic solution to the ever present problem of including people with severe aphasia in research about their own condition (Ali et al. 2013; Boyle, 2014; Brady et al., 2013; Hengst et al., 2005; Rose et al., 2016; Shrubsole et al, 2017).

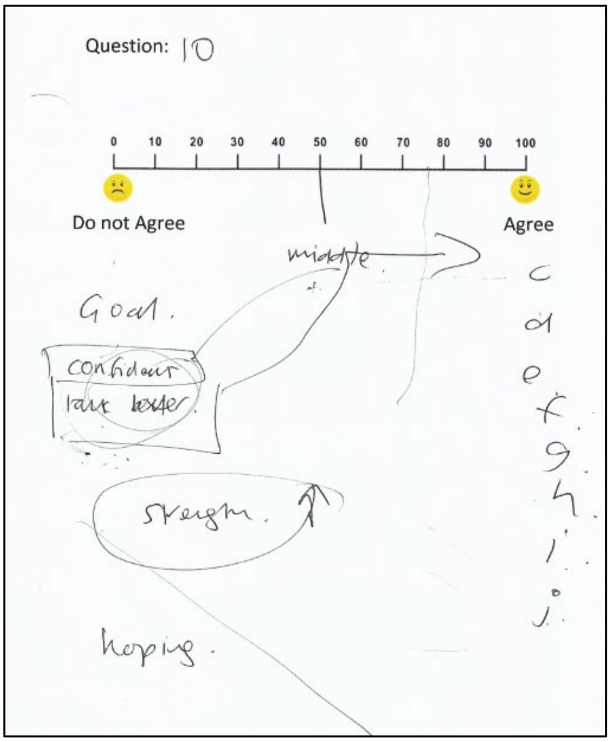
The verification technique used in this study did appear to allow participants with severe aphasia to agree and disagree with the thoughts of their ttps. For example, in p3's ttp a2, interview p3's husband was asked to say what he thought life might be like for his partner in the future. He responded with 10 statements about what he thought his wife might feel about the future. These comments were then presented to p3 for comment in her a2 interview. ttps comments and p3's responses are presented in Figure 5.4 ttp3's a2 Interview Responses to Question 10 and p3's Responses to These Comments. The technique worked in the same way for all three participants with severe aphasia and enabled them to participate in this research project even though they would normally have difficulty meeting the selection criteria for research that involves eliciting opinions about the experience of being part of an aphasia therapy trial (see Figure 2.4 Microsoft Excel Worksheet Summary of 68 Aphasia Noun Word Finding Therapy Studies)

Figure 5.4

ttp3's a2 Interview Responses to Question 10 and p3's Responses to These Comments

10. What do you think life will life be like in the future?

a. More Confident
b. Talk better
c. More independent
d. Talk to more people
e. Keep on improving
f. Get out a little bit more
g. Pretty much as we are
h. Dynamics will change when kids grow up
i. Optimistic
j. Progress will continue, going from strength to strength

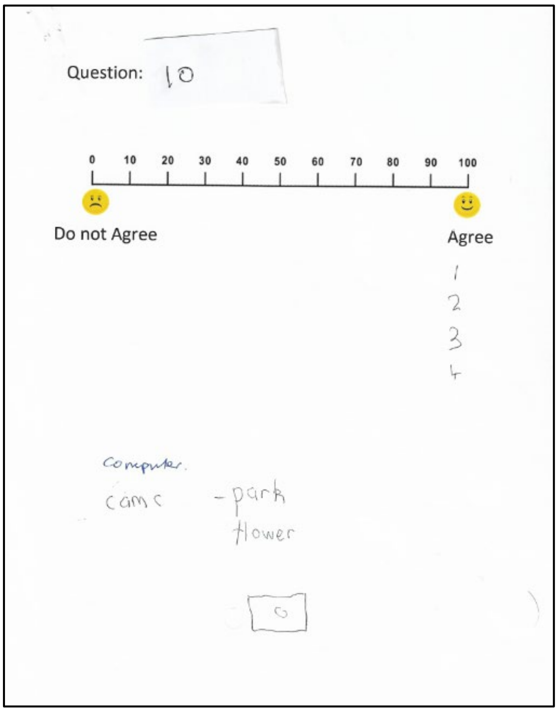


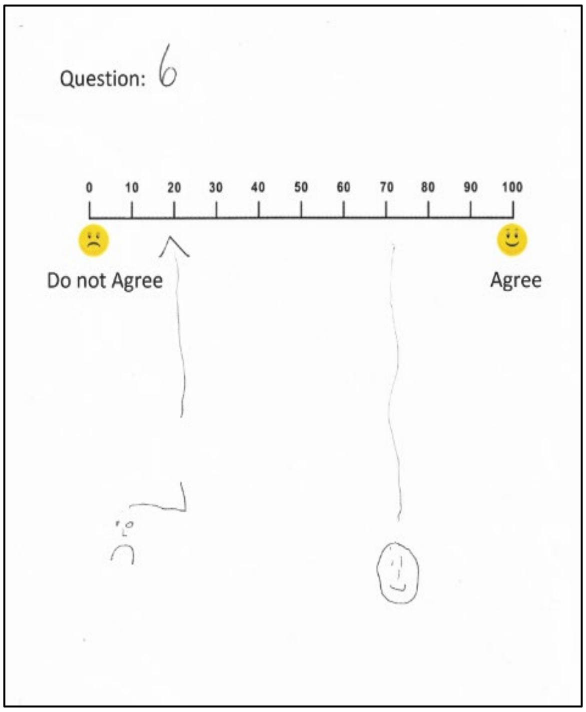
In addition to enabling the participation of the three participants with severe aphasia, the verification interview process and the interview sheets could also be a way of demonstrating improvements in communication. It seemed that participants spontaneously used more meaningful and a greater amount of multimodality communication following therapy intervention. For example, p1 presented with severe aphasia in interview 1 (Enderby et al., 2006; Goodglass & Kaplan, 1983). The same degree of aphasia was apparent at a3 (Enderby et al., 2006; Goodglass & Kaplan, 1983). However, in the interview conducted at a2, in response to question 10, what do you think life will be like in the future, p1 spontaneously wrote the words park and flower, part of the word camera and then drew a picture of a camera. This drawing was produced when the interviewer could not understand what he was trying to convey and mistakenly had thought that he was trying to convey the concept computer. See Figure 5.5 p1's Spontaneous Use of Multimodality Communication.

Furthermore, in the interview conducted at a3, in response to Question 6 Before this research project what was life like, p1 was able to signal that he had been unhappy at the start of the therapy trial but at the end of the trial he was happier. p1 signalled this by using the visual analogue scale and relating emojis to this scale. The two interview pages presented in Figure 5.4 p1's Spontaneous Use of Multimodality Communication illustrate these parts of the conversation which used multimodality conversation and remain a permanent record of the conversation taking place. Sheets like these are already used as a reference point that participants and interviewers can refer to, recap and confirm joint understanding (Kagan, 1998). They could also be used as another way of demonstrating the impact of activation therapy. This is because improvement occurred as a spontanous byproduct of activation therapy and participants were not trained to use them as part of a therapy programme. They are all the more significant when viewed in the context of an aphasia therapy case studies in which teaching the use of alternative strategies was unsuccessful (Beckley et al., 2013; Bruce and Howard, 1988) and in this activation therapy trial improved use of multimodality communication happened as a by-product of the main focus for therapy.

Figure 5.5

p1's Spontaneous Use of Multimodality Communication





5.8.6 ***The Links Between Participant Selection and Grammatical Analyses***

The exceptional inclusion of people with severe aphasia alongside people with other types of aphasia is unusual (Lloyd et al., 2006; Townend et al., 2007) as research tends to recruit people with the same type of aphasia (Edwards, 1995; Lind et al, 2009). Including people with different types of aphasia and different degrees of severity of aphasia increases the transferability and generalisability of the findings of this project and was a conscious and pragmatic choice (Ames et al., 2019; Guba, 1981; Shenton, 2004) during the design of the project. This choice however restricted the type of analysis that might be suitable for both people who could not find nouns at all and people who could speak fluently in complex sentences.

Because of its exhaustiveness, grammatical analysis was used to evaluate the spontaneous language use of 7 people with different types of aphasia. As highlighted by Edwards and Bastiaanse, 1998), linguistic analysis is not usually inclusive of all data and the inclusion of some data and exclusion of other information may not uncover the actual mechanisms that may demonstrate that change has happened (Webster et al., 2015). It may also avoid the reality that spontaneous conversational interaction is a co-constructed enterprise (Goodwin, 1995; McVicker et al., 2009). Some analyses concentrate on identifying pre and post intervention instances of certain linguistic categories (DeDe & Hoover, 2021) some analyses focus on identifying word finding difficulties (Herbert et al., 2013, and other studies may exclude the analysis of stereotypical language which contributes significantly to conversations between PWA and others (Bruns et al., 2019).

Grammatical analysis is a recognised way to evaluate the language of PWA (Lind, 2009; Edwards & Bastiaanse, 1998; Edwards, 1987; Penn, 1987; Penn & Behrmann, 1986) but it has not been used to evaluate the impact of therapy. It also has not been used to analyse the impact of impairment based intervention on multiple people with different types of aphasia. It may be that this analysis has uncovered length of noun phrase as an indicator of change because no other research has compared before and after therapy language samples in this degree of grammatical detail. This argument is supported by other grammatically based findings which have not been reported before and were apparent for 6/7 participants (see reports of reduction in use of miscellaneous language 5.8.1 Word Class), particular difficulty accessing nouns and other word classes associated with noun phrase production, articles, adjective and prepositions (see 5.8.1 Word Class), no change in lexical diversity (see 5.8.2 Lexical Diversity), predominant use of SV sentences (see 5.8.3 Clause level). p1, the participant with the most severe aphasia was the only participant that did not show these changes although his length of noun phrase did increase. In a1 he was unable to produce any words other than those that fitted into the miscellaneous category and in a3 he produced one noun, one pronoun and one preposition.

In this trial, all participants were asked to respond to interview questions which might predispose the language that they produced in response to the interview questions. The interview process may generate a different type of spontaneous language to that produced during real life conversations (Armstrong, 2000; Shadden et al., 1991). Furthermore, three participants with aphasia (p1, p2 and p3) had difficulty representing their own thoughts and were asked to represent their own thoughts in verification interviews by signalling their agreement and disagreement. This way of eliciting opinions in a therapy experience interview may have predisposed these three participants with aphasia to overuse yes and no responses and increase their use of words classified as miscellaneous word class. The use of the everyday clinical interview as a way of eliciting language means that the findings reported in this clinical trial are not representative of all spontaneous talk with PWA and are preliminary findings of the way that seven PWA talk in an interview situation. Its tentative findings would benefit from replication.

5.9 Grammatical Results Summary

Interviews were analysed grammatically to investigate the third aims of the research project which was to use grammatical analysis to evaluate the impact of activation therapy on sentence structure. Results indicated that noun phrase length changed over the course of the therapy trial, phrases became longer and this difference was statistically significant. This result may be relevant for future research that tries to assess the impact of word finding therapy on discourse and it may have clinical applications because noun phrase length is an easy and accessible measurement (Bryant et al., 2017) and it would not be too time consuming to use in clinic (Bryant et al., 2017; Cruice et al., 2021; Kim et al., 2019). Analysis also suggested that activation therapy without word finding may have an impact on the use of meaningful language in that exclamations, fillers, incomplete words, yes, and no, were less likely to be used after activation therapy without word finding and this result was statistically significant. A course of activation therapy with word finding did not have this same effect and there was no measurable change in the way that participants used phrases before and after activation therapy in which participants practised finding words out loud.

Language indicators that have been used to detect change in other discourse level research such as word class and lexical diversity did not change over the course of activation therapy. This is a noteworthy finding that has not been discussed in the literature before now and suggests that these indicators may have limited relevance in conversations in which word usage does not equate to interactional adequacy. Finally, this chapter introduced the verification interview which allowed people with severe aphasia to participate in this research project and provide information about how they felt about the experience of living with aphasia and taking part in this activation. This is not always possible in aphasia research (Brown, 2010; Palmer et al., 2014; Parr et al., 1997; Mumby & Whitworth, 2013) and it is a strength of this project. It is hoped that the verification interview process is transferrable into clinical practise (CASP, 2020) because it would not require any additional training and could be carried out within routine clinical appointments (Bryant et al., 2017; Kim et al., 2019).

Chapter 6 Thematic analysis Findings

6.1 Introduction to the Thematic Analysis Findings Chapter

The quantitative results presented in chapters 4 and 5 suggested that activation therapy had a positive impact on word finding and noun phrase length. Word finding therapy results, presented in chapter 4, suggested that activation therapy with and without word finding had a beneficial effect on words targeted in therapy and that people with aphasia do not have to practise word finding for word finding to improve. The impact of activation therapy with and without word finding also generalised to other similar words not targeted in therapy. It was argued that this specific improvement in word finding skills could not be attributed to other factors such as brain recovery, attention or feelings of wellbeing because whilst word finding improved, control measures remained relatively unchanged.

Chapter 5 examined the impact of activation therapy on grammatical structure on the spontaneous language used in therapy experience interviews. Results seemed to indicate that noun phrase length might be a clinically relevant indicator of language change as all seven participants showed the ability to use longer noun phrases after twelve weeks of activation therapy. The analysis also seemed to indicate that participants were more likely to use meaningful words after activation therapy without word finding and they were less likely to use fillers, unanalysable language and exclamations. This effect was not measurable after a comparable six weeks of activation therapy with word finding therapy.

Therapy experience interviews were used for two types of analyses in this research project. The first purpose was to collect a sample of language that could be used in the grammatical analysis of participants' language (Aim and Objective 3). This process has been described in Chapter 5 Grammatical Analysis Results and included identifying and comparing the grammar used by the seven participants in equivalent a1, a2 and a3 interview extracts (see 5.4.1 Methodological Considerations for Grammatical Analysis of the Therapy Experience Interviews). Interviews were also used to investigate the experience of participating in the activation therapy trial (Aim and Objective 4) using the thematic analysis framework outlined by Braun and Clarke (2006). This duality of analysis emanating from the same set of data is not typical of a mixed methods research project.

Monomethod research usually uses data sets which are collected and analysed separately, Quantitative grammatical analysis data is collected through spontaneous language elicitation techniques and analysed quantitatively (Edwards and Bastiaanse, 1998) whilst qualitative interview data is collected and analysed using qualitative methods (Mumby and Whitworth, 2012). See 3.2

Mixed Methods for a detailed explanation of the concurrent, mixed two method data collection, three method data analysis research design used in this activation therapy trial and the underpinning rationales which guided its inception.

As with the preceding chapters, information about thematic analysis (Braun and Clarke, 2006) data collection, analysis and rationales will be presented in this chapter rather than the general methodology chapter, Chapter 3**.** This decision was taken so that issues that were specific to each evaluation method were presented alongside the conclusions that were derived from its analysis. However, the therapy experience interview procedure was used for two purposes the first to extract grammatical analysis data and the second as therapy experience interviews for thematic analysis (Braun and Clarke, 2006). Thematic analysis is an accessible and flexible approach to qualitative data analysis (Braun & Clarke, 2008 p. 77) which can be used with other research methods to investigate the qualitative and quantitative impacts (Creswell, 2007) of activation therapy. The challenges of the same person analysing different types of data were offset to some degree by analysing each data set sequentially and not simultaneously and only integrating the findings as part of the final phase of the research project (see Figure 3.2 Concurrent Mixed Two Method Data Collection and Three Method Data Analysis Research Design Used in this Activation Therapy Trial and Figure 7.4 Visual Representation the Integrated Mixed Methods Evaluation of the Impact of Activation Therapy) but also see 6.5.2 Different Possible Interpretations for the Positive Impact of Attending the Activation Therapy Trial.

The therapy experience were conducted using the interview procedure has been described previously in 5.3 Therapy Experience Interviews a Combined Grammatical Analysis and Thematic Analysis Data Collection Procedure. The way in which they were transcribed has also been described previously in 5.4 Grammatical Analysis and Thematic Analysis Interview Transcription Procedure and this information will not be reduplicated here. The 40 interviews with 7 PWA and their ttps provided a rich data set that was used to analyse the impact of activation therapy with and without word finding. This is the first time thematic analysis has been used to investigate the qualitative impact of impairment base therapy and the 11.64 hours of a1, a2 and a3 interviews were transcribed onto 212 pages of interview records. These transcriptions detail the spontaneous responses of the seven PWA and their ttps to ten non-directive questions about participating in the activation therapy and are a significant contribution to understanding the impact of activation therapy with and without word finding. What follows in this chapter provides, a theoretical background for why and how thematic analysis was conducted, its findings, its limitations, a discussion about the implications of these findings for future research into the therapy experience and clinical practice and finally a triangulation and integration of the three research findings will argue that activation therapy had a specific impact on noun and noun syntax which was apparent in everyday talk.

6.2 Rationale for the Thematic Analysis of Interviews Research

The qualitative experience of the impact of activation therapy with and without word finding will be examined in this last results chapter. Most aphasia therapy studies to date have focused on the quantitative impact of activation therapy on word finding (Wisenburn & Mahoney (2009) and the qualitative experience of the experience of aphasia intervention has been studied less frequently (Devanga et al., 2021; Greenwood et al. 2010; Mumby & Whitworth 2013; Van Der Gaag et al, 2005; Wade et al., 2003). Even within this limited evidence base research into the impact of aphasia therapy is limited. Research by Mumby and Whitworth (2013) and Van Der Gaag et al. (2005) evaluated the impact of community support programmes and Wade et al. (2003) the impact of self-administered computer therapy.

Greenwood et al. (2010) are one of two groups of researchers to have reported the impact of face to face cueing therapy for a single client with anomia and compared before and after scores on the Communication Disability Profile (Swinburn & Byng, 2006). They found that successful cueing therapy was associated with a measurable impact on his views of aphasia and daily activities (Greenwood et al., 2010 p1009). Devanga et al., (2021), are the second research group to investigate the impact of direct therapy word finding therapy. They described the impact of a collaborative referencing intervention with four dyads of people with aphasia and their significant other and used social validity interviews to ask each dyad about the impact of therapy. The researchers identified 27 evaluative comments, three of which were negative and then then sorted these comments into three themes which they labelled, the value of talking about personal lives, the value of engagement with the clinician and communicative success across settings.

Both of these research studies seem to have included quantitative measures to evaluate qualitative experiences, the Communication Disability Profile (Swinburn & Byng, 2006) and counting statements (Devanga, 2021) and this inclusion of quantitative evaluation removes the account of living with aphasia from the meaning making of those living with it (Guba, 1981). The lack of focus on the qualitative aspect of the lived experience of therapy is apparent even though client satisfaction has been established part of any service or healthcare delivery system for more than twenty years (Department of Health, 2000, 2008).

There is a lot of research that suggests not only affects PWA but it also has a significant impact on those living alongside them. Kinsella and Duffy (1979), Oranen et al. (1987), Croteau (2011) suggest that marital relationships are disrupted because of aphasia. Whilst Schulz et al. (1988) McGurk et al. (2011) reported that those living with PWA were likely to suffer depressive symptoms. Simmons-Mackie and Damico (2001) and Croteau and Le Dorze (2011) highlighted that aphasia also changes the social opportunities of both the PWA and their advocates. This research suggests that the effect of aphasia can be seen to extend beyond the person with the communication difficulty. The qualitative methods used in this study were designed to investigate how participating in an activation therapy programme impacted on both participants with aphasia and their significant others, their therapy trial partners (ttps). This project used, clinically feasible and desirable (Isaksen, 2014), semi structured individual interviews to ascertain how participating in a course of activation therapy affected the seven participants with aphasia and their ttps.

This chapter addresses the fourth aim and fourth objective of this research project

Aim 4. To use aphasia therapy interviews as a way of understanding the impact of activation therapy on the experience of living with aphasia by

Objective 4: Using thematic analysis of therapy experience interviews to identify the qualitative reported impact of participation in the activation therapy trial

6.3 Thematic Analysis Process

The 40 therapy experience interviews that were elicited during this research project were all included in the thematic analysis of the impact of activation therapy. As argued in 6.2 Rationale for the Thematic Analysis of Interviews Research, appears to be no narrative evidence about the experience of aphasia intervention from the people who are the recipients of it. The need to give a voice to people receiving therapy, who are not well represented in the aphasia literature should be a priority for clinicians (Department of Health, 2000, 2008; Frost & Ouellette, 2011) and should help the research and aphasia community to develop a deeper understanding of what PWA and their ttps thinks about receiving direct aphasia intervention (Creswell, 2013). It may provide information that may be relevant to others providing and receiving therapy outside this very sample of 14 PWA and their ttps.

Each participant and their associated ttps were interviewed individually in each assessment phase of this clinical therapy trial, a1, a2 and a3. The same set of ten non directive questions were used in semi structured interview schedule (see 3.6 Therapy Experience Interviews) and using the same procedures (see 5.3 Therapy Experience Interviews a Combined Grammatical Analysis and Thematic Analysis Data Collection Procedure). Interviews were transcribed (see 5.3.4 Grammatical Analysis and Thematic Analysis Interview Transcription Procedure) and these individual transcriptions were used as the focus for this part of the investigation.

Interviews were analysed using the six steps outlined by Braun and Clarke (2006): familiarisation, generating initial codes, searching for themes, reviewing themes, defining and naming themes and finally producing this report. Because the aim of the research project was to analyse change over time, a1 interviews were analysed first, then a2 interviews and then finally a3. It was thought that patterns of change might be more recognisable if the data was analysed chronologically. Individual interviews were not analysed randomly but in a predetermined order in which the viewpoint of the

PWA was central. Within each assessment phase, interviews with PWA (p4, p5, p6, p7) were analysed first because these people with aphasia could represent their own views. Then all ttp interviews were analysed. Finally interviews with p1. P2 and p3 were analysed last. Table 6.1 Therapy Experience Interview Analysis Order is a visual representation of the 40 interviews and the numbers denote the order in which they were analysed.

Interviews conducted with p1, p2 and p3 were analysed last because these participants had difficulty representing their own thoughts and viewpoints. Researchers such as Guba's (1981), Berzon et al. (1993), Shenton, (2004), Williams et al. (2006) and Cruice et al. (2015) might consider this type of interview the least authentic because the information discussed in these interviews was based on information already elicited from their ttps and not information the participants with aphasia had initiated themselves. This theoretical consideration was weighed against the imperative to include people with severe aphasia (Ali et al. 2013; Boyle, 2014; Brady et al., 2013; Hengst et al., 2005; Rose et al., 2016; Shrubsole et al, 2017) a barrier that much aphasia research has yet to achieve (Cruice, 2003; Doyle et al., 2013; Hilari, 2011; Mumby & Whitworth, 2013). Analysing interviews in this order meant that p1, p2 and p3's views could be included in the analyses and could be considered as a type of member check (Guba, 1981; Shenton, 2004) which allowed interviewees to respond to and add detail about the experience of living with aphasia already suggested by their ttps.

Table 6.1

Therapy Experience Interview Analysis Order

a1		a2		a3	
1	p4	15	p4	28	p4
2	p5	16	p5	29	p5
3	p6	17	p6	30	p6
4	p7	18	p7	31	p7
5	ttp4			32	ttp4
6	ttp5	19	ttp5		
7	ttp6	20	ttp6	33	ttp6
8	ttp7	21	ttp7	34	ttp7
9	ttp1	22	ttp1	35	ttp1
10	ttp2	23	ttp2	36	ttp2
11	ttp3	24	ttp3	37	ttp3
12	p1	25	p1	38	p1
13	p2	26	p2	39	p2
14	p3	27	p3	40	p3

After detailed orthographic transcription and familiarisation with the data had been completed, transcribed (see 5.4 Grammatical Analysis and Thematic Analysis Interview Transcription Procedure) the 40 interviews were coded individually. Braun and Clarke (2006) refer to this as the second phase of thematic analysis. Each line of each interview was analysed, coded and organised into groups. Codes were generated manually from the interviews. Manual coding was chosen rather than coding through a software programme such as QSR International's NVivo 10 software. This choice was based on personal preference as the analyst found it easier to understand, process, remember and manipulate printed data rather than analysing data with a computer programme and computer screen. This preference is in line with research that suggests that print is superior to screen. When the two mediums are compared print facilitates comprehension (Mangen et al., 2013), enhances memory of key points in the text (Singer and Alexander, 2017), heightens recall (Jones et al., 2005) and is portable, dependable, flexible and ergonomic (Spencer, 2006). It is also possible with a small group of quite diverse participants and their ttps where it is advantageous to retain a sense of each individual partnership.

Coding was data driven throughout the thematic analysis process (Braun and Clarke, 2006) and at the end of each interview the analyst wrote a memo about the interview and created a handwritten code map that placed similar items of codes together in a group and placed other unconnected codes further away. A graphic representation of p3's a3 code map is presented in Figure 6.1 in which the codes were grouped in the following ways, 323, 223 life at home, 114, 419 outsiders don't care but p2 another PWA does, 374, 452, 351 she is doing more, 95,180 how aphasia affects her, 617, 268, 307 she is feeling more positive, 31,22, 64, 38 she is positive about therapy, 287 when she first had aphasia it was like being a child all she could say was olive. These techniques allowed the analyst to make partial and provisional notes about each interview and represent possible connections and relationships between codes within each interview.

Figure 6.1

Graphic representation of the code map produced after p2's a3 interview

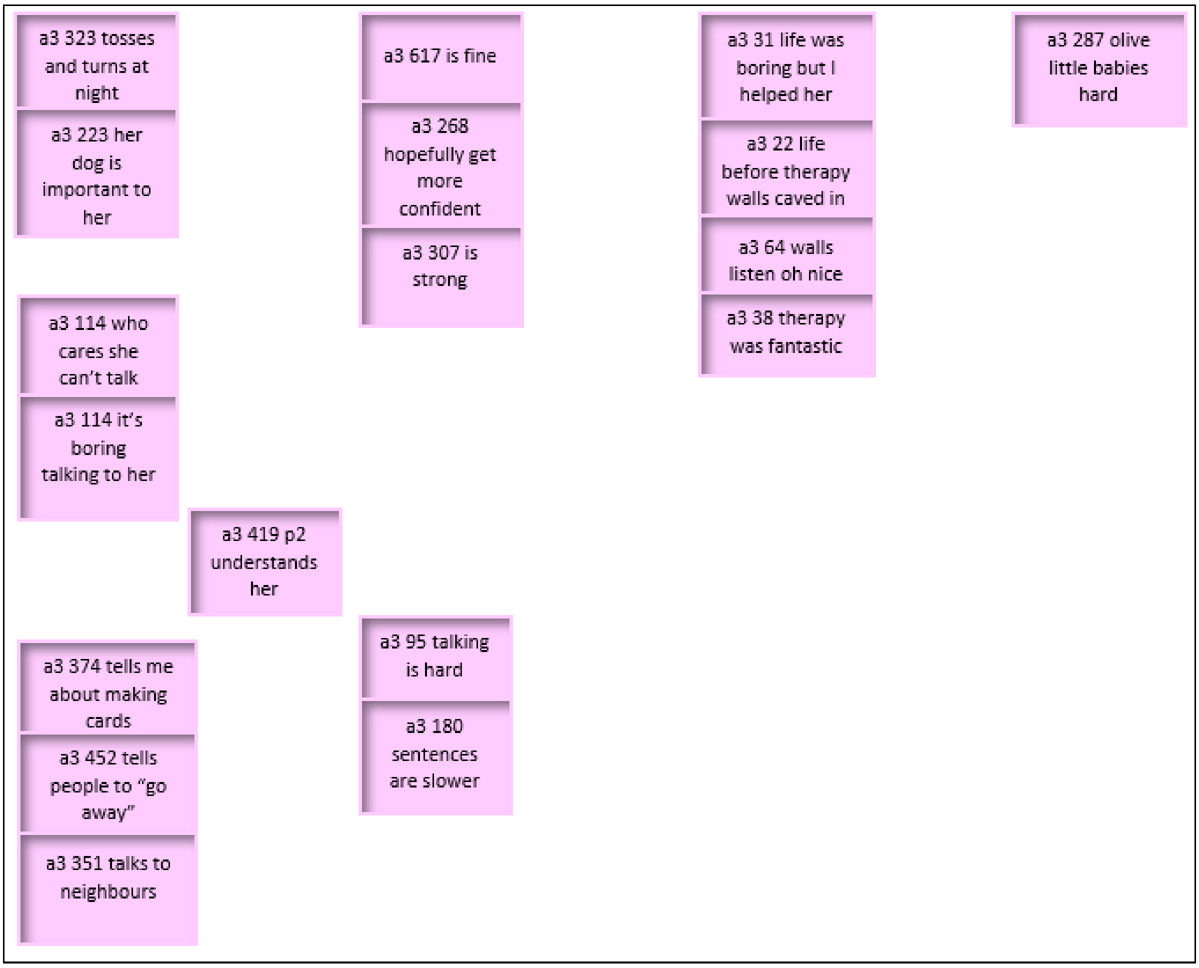
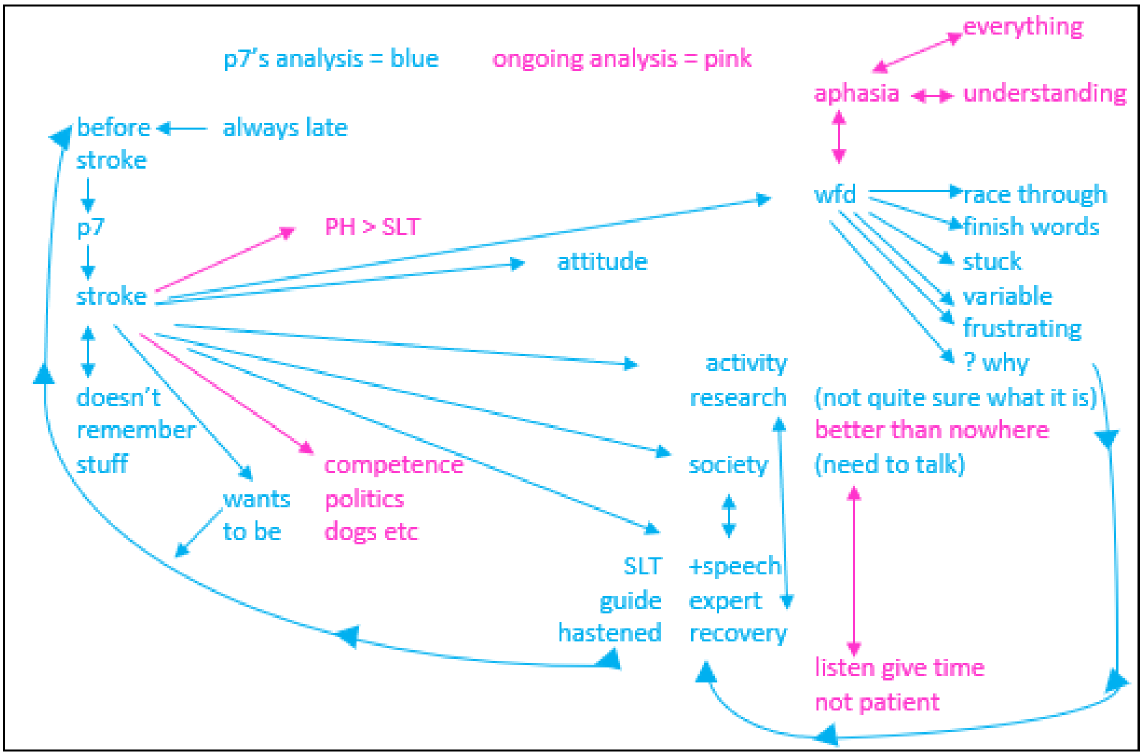


Diagram making was used sequentially throughout the code making process. After the first interview codes were linked together in a code diagram. Thereafter each interview was compared with the previous diagram to identify commonalities and differences throughout the data set and this re-conceptualisation resulted in a new diagram after each interview. This constant comparison with easy to change diagrams allowed the analyst to continually engage with the interview data, their codes and the way in which they were connected. A graphic representation of possible codes and how these might be related to one another both within p7's a2 interview and across the whole data set is presented in Figure 6.2 Graphic representation of a diagram created after p7's a2 interview.

In this diagram the pink writing represents the overall diagram that was created to the interviews that had preceded it. The blue writing represents the codes from p7's a2 interview and these are located close to the pink codes, or linked via arrows to pink codes to highlight possible relationships to them. The blue writing in Figure 6.2 Graphic Representation of a Diagram Created After p7's a2 Interview summarises the way in which p7 thinks about himself and his stroke, his attitude to the research project and his aphasia and word finding difficulties. The pink writing links p7's interviews to previous analyses that highlight the competence of PWA and the relative importance of speech over physical health. The way that speech therapy is supportive and a positive thing to do and finally the way that aphasia affects everything including word finding. This diagram making enabled a constant refinement of the way in which PWA and their ttps talked about their participation in this activation therapy trial.

Figure 6.2

Graphic Representation of the Overall Diagram Created After p7's a2 Interview



Code mapping and diagram making cross, cross back and cross between Braun and Clarke's (2006) six phases of thematic analysis phase 1 transcription, phase 2 generating initial codes, phase 3 searching for themes, phase 4 reviewing themes, phase 5 defining and naming themes and phase 6 producing the final report of thematic analysis. In this study, initial coding was followed by constant analysis and comparison between interviews allowed the investigator to search for themes, review themes, define and name themes and finally produce this report. The process was iterative and concluded with the final submission of this thesis.

6.4 Thematic Analysis Findings

Thematic analysis (Braun & Clarke, 2006) was used to understand the qualitative impact of activation therapy on the participants and ttps in this therapy trial. It was used to address a different type of research question than the questions addressed in chapter 4 word finding and chapter 5 grammatical analysis. Thematic analysis (Braun & Clarke, 2006) was used to contribute to a holistic understanding of the meaning of activation therapy for those who participated in it and their accounts of experiencing the therapeutic process (Braun & Clarke, 2019). One overarching theme and four themes were developed as part of the thematic analysis process (Braun & Clarke, 2006) that could be used to explain what participants and ttps thought about therapy.

Participants viewed activation therapy as a positive force in their lives because they contended that aphasia affected everything in their lives. They felt that communication had improved as a result of therapy (6.4.1 Talking is Better - Introduction). They reported that they felt more like the person they were before the aphasia and felt more like themselves (6.4.5 Regaining Lost Self – Introduction). Activation therapy was also associated with less reliance on the people they lived with (6.4.9 Alleviating Reliance on Close Others – Introduction) and changes in the way they interacted with those outside their small social sphere (6.4.13 Re-engaging with Other Others – Introduction 6.4.13). They associated activation therapy with welcome changes in these four areas and they were unequivocal about the way that they attributed these changes to participating in the research project.

Figure 6.3

Thematic Map of Participants' and ttps Perceptions of the Impact of Activation Therapy

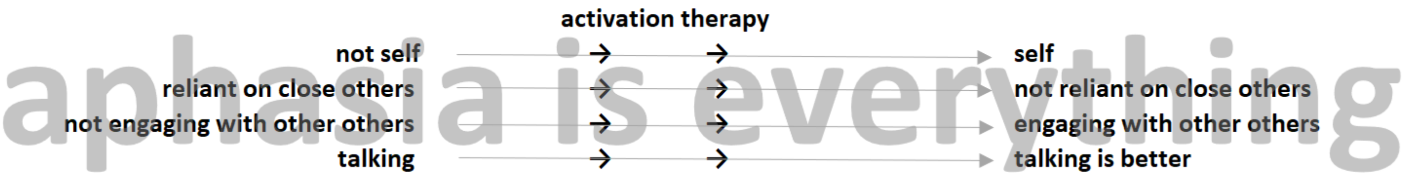


Figure 6.3 Thematic Map of Participants' and ttps Perceptions of the Impact of Activation Therapy is a thematic map of how the participants with aphasia and their ttps described the impact of participating in the activation therapy trial. The benefits to well-being for both PWA, their ttps and the way in which they interact with others will be outlined in the next four sections in this chapter. A summary of how the issues that were discussed were translated into codes, subthemes and themes suggests a process that was clear cut and simple however the process of meaning making was lengthy, tautologous, tangled, iterative, reflexive and only completed when the final draft of this study was submitted. This summary of how the codes were translated into themes is presented in Appendix 21 Summary of Issues Discussed and Their Translation into The Four Main Thematic Analysis Themes Talking is Better, Self, Close Others, Other Others.

Braun and Clarke (2006) defined the final stage of thematic analysis as producing the report. In this phase they recommend the use of data extracts to demonstrate the underlying data that supported the way in which themes have been derived. They also suggested that results are most convincing when presented in the context of related literature. Braun and Clarke (2006), Graneheim and Lundman, (2003), Kondracki et al. (2002) and Downe Wamboldt (1992) suggest that the thematic analysis proposed in this research can be supported and made more transferable to other contexts by aligning it with previous research. The authors also suggested that any differences with previous research findings need to be distinguished and highlighted. The following will describe the overarching theme and the four themes that were constructed to make meaning (Braun & Clarke, 2019) of the activation therapy trial experiences of seven PWA and their activation therapy trial partners. Each part is divided into three distinct sub sections, an introduction to the theme, a data driven description the theme, and the theme in the context of the aphasia literature.

6.4.1 *Talking is Better - Introduction*

This is the first theme that will be discussed in this chapter. Thematic analysis (Braun & Clarke, 2006) suggested that participants and their ttps associated the activation therapy trial with positive changes in participants' ability to use language. They described the debilitating impact of aphasia and suggested that because language is integral to every part of life, having aphasia affected every aspect of living. ttps and participants suggested that the overwhelming impact of participating in the trial was positive and described many different ways that they had noticed changes in language use over the timeframe of this study. They also identified that therapy was very tiring and curtailed the amount of other activity they could participate in on the days that activation therapy happened. Participants and ttps in this study suggested that they had no compunction in attributing the language gains that they described to participation in the activation therapy trial.

6.4.2 Talking is Better - Theme

ttps and participants with aphasia referred to aphasia as a phenomenon that impacted on every aspect of their lives. They were emphatic about how it had affected them and suggested that living with aphasia was more difficult than living with the physical problems that had resulted from their stroke. They also referred to language problems as longer lasting than the physical problems that they had encountered. Participants with aphasia almost negated the impact of physical difficulties in comparison to the consequences aphasia and they suggested that life with aphasia was living in a place where language could not be used to ameliorate the impact of an inhospitable environment.

"um speech isn't just speech it's everything" p5 a2

ttps understood what aphasia was and how it affected their ability to interact with their partners with aphasia. They described aphasia as something that affected comprehension and was evident in word finding difficulties that were very difficult to resolve at the time when they were affecting the conversational interaction "sometimes he talks a load of jumble I mean you know and he can I mean there's one classic time we were out and he said why do they put all these dandelions everywhere and I said dandelions dandelions what do you mean he's talking about traffic cones well you tell me a link between a dandelion and a traffic cone the uh you know he's far from it so you have to rewind and think right ok" ttp7 a1

6.4.3 ***Changes to the Talking is Better Theme Within the Timeframe of this Study***

Participants and ttps reported that they thought therapy had been of benefit and they talked about the ways that participants' language had changed during the time they were involved in the activation therapy trial. ttp2 reported that she thought her husband was understanding more than in the past. ttps described word finding as quicker and easier and described participants who were having fewer word finding difficulties. ttp7 suggested that she thought therapy had "loosened" p7s tongue. ttp1and ttp3 also recounted surprise at the words that had emerged unexpectedly over the course of the activation therapy trial. Participants were described as persevering more when they encountered word finding difficulties and had used self cues to help them find elusive words.

"one off words that I thought blimey I never heard you use that one before where did that one come from" ttp3 a2

"it's sort of it it's now I can sort of think right they were they were worry through that was stuck" p7 a3

Reports about language improvements were not restricted to single words, ttps described improvements in sentence structure and sentence production. Activation therapy also seemed to be associated with being able to talk a bit more and having conversations for maybe the first time. It was also associated with having better conversations with other people and these changes had been noted by children, sisters, mother-in- laws and hairdressers. Interviewees reported language changes in different language modalities and had observed improvements in reading, writing, non-vocal and signed communication systems.

interviewer "you walk the dogs

p2	and (points to self)
interviewer	ttp2 walks the dogs
p2	and (points to self)
interviewer	you walk the dogs
p2	and walk it's one wawawawa (signals talking right and left)
interviewer	you're talking now
p2	yes (with emphasis) and it's uh
interviewer	and that's good
p2	place uh how much um money house ih it's one (signals on going in a circular motion) no it's one okay it's one (ararar points to mouth then ararar points away from self) it's um
interviewer	so you and ttp2 can have a good conversation
p2	yes" p2 a3

It also appeared that participants and their ttps noticed changes in quality of the language used by participants with aphasia, their pragmatic skills. ttp7 suggested that her partner was able to use colloquial language. ttp6 described her husband's ability to say things more concisely, his use humour that had been inaccessible to him since his stoke and she described how her husband instinctively changed the way he used language when he talked to their young granddaughter. She also described how they could now have an argument but did not recommend it as an ideal thing to do. In a similar anecdote ttp1 reported that his son was able to assert what he wanted to do more often and may even tell his father off.

"he also expresses his independence quite often and he won't do things if he doesn't want to do them and he will tell you that he doesn't want to do them or tell you off if you try and make him do it" ttp1 a3

It may be that the participants in this trial were different to other people with aphasia. They may have had a particular set of characteristics that enabled them to engage with the activation therapy trial and benefit from it. Participants were described as desperate to talk more and even without language, explained how they were not happy with their lack of communication and therefore motivated to participate in the activation therapy trial. Participants and ttps described small but slow progress since the time of the stroke and explained how they expected that trajectory to continue for the rest of their lives. ttps and PWA described how they had already tried as much as they could to regain language and would strive to improve in the future, participants with aphasia were described as hard workers. p5 explained her willingness to participate in the therapy trial as embracing the possibility of improvement. ttp2 stated that she knew her husband's aphasia was an intractable problem and understood that a miraculous cure was unlikely, but she still hoped for change. Both p5 and p6 suggested that they had higher expectations than living as they were for the rest of their lives. The personal characteristics used to describe the PWA in this therapy trial maybe exceptional and peculiar to those who volunteered to take part in this research project. However, it may also be a significant factor that contributed to the impact of activation therapy in this study and maybe even necessary for the success of any aphasia therapy trial.

> "I think so I think because my speech isn't very good now eventually it will be better got to be (fist shake and laughs)" p5 a2

> you have to have a something there (raises hand to head level) but this one is (hand at chest level and points at hand) that um but there I want to go to (raises hand to head level)" p5 a3

Not all the consequence of therapy were positive. ttps and participants with aphasia suggested that therapy was very tiring and suggested that once they had participated in the therapy session there was not a lot of energy left to do anything else. They used terms such as "knocking him for six" ttp6 a2, "whacked mentally" ttp5 a2 almost as if the effort of attending and returning home after therapy and engaging with a therapy session was more exhausting than anything else they did in their lives. The final part of this narrative about language is better is spoken by ttp6 a3 whose words represent his belief that the positive changes in language skills outlined in this subtheme were attributable to participating in the activation therapy trial.

> "um he's really looked forward to coming and doing it but it absolutely zaps him he he's worn out um and so we've had to adapt our week um Wednesday afternoons is we don't do anything on a Wednesday unless it's sort of sit in in a xxx and not doing anything you know really it he he's really worn out he's also very upbeat so he's he's feels quite motivated by doing this but it does he said it's like brain brain tiredness cause we were trying to describe it and I said is it like when

you used to work and have a really hard day producing something and he said yes it's sort of like that so so it's definitely brain tiredness" ttp6 a2

6.4.4 *The Literature and the Talking is Better Theme*

This is the first time that Thematic analysis (Braun & Clarke, 2006) has been used to understand the experience of participating in an impairment base aphasia therapy trial despite the therapeutic interview being integral to every productive client and Speech and Language Therapist relationship (Bixley et al., 2012, 2014; Shrubsole et al., 2017; Simmons-Mackie et al., 2016, Simmons-Mackie et al. 2020). Furthermore, very few other studies have attempted to investigate the qualitative experience of participating in word finding therapy trial (Devanga et al., 2021; Greenwood et al. 2010) and this study adds qualitative evidence base to support the impact of aphasia therapy beyond the impact of word finding therapy alone. The way that participants with aphasia and their ttps thought about participating in the activation therapy trial suggests that they thought that talking had improved over its time-course and they noticed gradual improvements many years after the onset of aphasia and outside of the time frame that experts suggest improvement could occur (Pulvermuller & Berthier, 2008).

Kagan's (1998) supported conversation principles suggest that gesture, written key words and drawing should be used to enhance the natural flow of communication, what Pound et al. (2000) and Rautakoski (2011) subsequently called using total communication. There is very little evidence about the best way to enable PWA to use these strategies spontaneously (Pierce et al., 2019). First PWA need to be able to use and want to use multimodalities (Hopper et al., 2002) and secondly, they need to know when to use it (Beckley et al., 2013). Research has suggested that PWA have difficulty implementing these multimodal strategies within conversations. Beckley et al. (2013) provided conversational therapy for a 55-year old man and his partner. In therapy they taught their client to use writing and drawing to overcome conversational difficulties but they found that their client was unlikely to use these strategies without being prompted. What is significant in this trial is that all seven participants used multimodality strategies without any direct therapy to show them how and when to use these techniques. Participants spontaneously acted concepts they could not say, signalled a concept through gesture, used facial expression, used referents, used symbolic noise, used touch symbolically maybe because this type of interaction was modelled, accepted and practiced by the interviewer within therapy experience interviews and participants felt enabled to use them.

Participants were also able to spontaneously self-cue after activation therapy. This too is unusual. Sampson and Faroqi-Shah (2011) and Purdy and Koch (2006) suggest that self-cueing requires cognitive skills and cognitive flexibility. A PWA needs to recognise that they are experiencing a word finding difficulty and then implement a strategy that might enable them to say the word they are searching for. Bruce and Howard (1988) described a study in which they tried to teach 20 people with Broca's aphasia to phonetically self cue themselves and none of their participants could acquire this skill reliably. Wambaugh et al., (2013) encouraged their nine participants with aphasia to use a mediating self generating semantic feature self cue and could not find evidence that it was used in the structured language elicitation tasks designed by Nicholas and Brookshire (1983). What is significant about participation in this activation therapy trial is that without direct intervention, participants persevered to overcome word finding difficulties and sometimes cued themselves into finding words they could not say. p2 used five fingers to prompt the word five, p6 used his previous fluency in sign language to cue himself with signs (Frick-Horbury, 2002) and p4 and p7 used the activation therapy prompts as a way of self cueing themselves into finding a word that was not available, in much the same way as Wambaugh et al. (2013) had encouraged their participants to use the semantic feature analysis chart to self-cue.

6.4.5 Regaining Lost Self – Introduction

People with aphasia and their ttps felt that aphasia had resulted in the PWA being less of a person than they were before they had their stroke. They wished that they could "turn the clock back" ttp6 a2 and become that person without stroke and aphasia again. ttps and participants described the emotional impact of living long term with aphasia and the way that communication was affected by emotion and a lack of language made it more difficult to self-regulate and retain emotional equilibrium. See Appendix 21 Summary of Issues Discussed and Their Translation into The Four

Main Thematic Analysis Themes Talking is Better, Self, Close Others, Other Others for a summary of these interviews and how they were translated into the regaining lost self theme. Within the timescale of the activation therapy trial ttps and participants described participants who were more themselves and this regaining self was associated with positive emotions, renewed effort and enthusiasm and some noticeable cognitive changes.

6.4.6 *Regaining Lost Self Theme*

Thematic analysis suggested that aphasia had negatively affected the way that PWA thought about themselves. Participants and their ttps described an approach to aphasia that was pragmatic and resilient and described an attitude of making the best out of what they had. PWA described themselves as not normal and ttps echoed this perspective when they described their partners with aphasia as different, the same but different. PWA and their ttps talked about not being normal as if there was a part missing. They describe a life that none of them are happy with or adjusted to. P3 recounted disparagingly that after her stroke she talked like a child. ttp3 and ttp5 report that aphasia means that their wives find it hard to cannot fit in with what is going on in the world around them because of their aphasia and ttp5 recounts his wife's belief that this inability to be socially unremarkable is not normal.

> "Life just normal normal old life I I mean she whispers quite often in my ear and would say but it's not normal that's a standard phrase standard phrase when she x activity and I thought she'd x activity really well and I've said fantastic that's really good not as good as it used to be and that's what drives her it's not as good as it used to be and her y activity you know it's not as good as it used to be and that's a standard an she's always having for to be she just wants to be normal but that's hard to be normal" ttp5 a2

Participants and ttps described a spectrum of emotions that they associated with living with aphasia anxiety, nerves, worry, stress, frustration and anger. They described emotional states that were changeable. Interviewees suggested that the participants' ability to regulate emotions had changed post stroke and for some partnerships this lack of self-regulation presented an ongoing challenge to living successfully with aphasia. Individual experiences were different for example p7, with the most fluent language, described how he decided he was going to talk himself out of his depression whereas p1 who had very little language, described an ebb and flow of feeling that he had very little control over. These interviews suggest that people with more severe aphasia were less likely to be able to rationalise their emotional responses to life events and this lack of regulation could impact negatively on their lives. Both PWA and their ttps needed to accommodate the impact of living with aphasia on the emotional self.

"interviewer	he said he thought you were fairly happy
p1	(points to 10% and 95% and points to right shoulder)
interviewer	so sometimes you're not happy sometimes you're darn miserable
p1	yeah
interviewer	yeah and sometimes you're okay
p1	yeah (thumbs up and smiles)
interviewer	yeah and is there any pattern to this is it all the time
p1	yeah
interviewer	all the time you can be up and down
p1	yeah (mimes happy go lucky then miserable)
interviewer	does it kind of go peaks and troughs
p1	yeah um oh (underlines 95% four times saying) ah ah ah ah (underlines 10% once whilst saying) no
interviewer	so most of the time you're happy you get on with it but very now and again it makes you feel really
p1	yeah
interviewer	and is that your stroke do you think
p1	yeah
interviewer	yeah and your talking and walking
p1	yeah
interviewer	and everything just gets you down
p1	yeah
interviewer	and how do you get yourself out of it do you just snap out of it
p1	(shakes head signals don't know) no
interviewer	no just happens and then you're back to coping again
p1	yeah
interviewer	yeah yeah must be hard
p1	yeah" p1 a2

The interviews provide an opportunity to think about aphasia as an assault on the self. This assault was unexpected and its consequences were devastating and long lasting. The people in this trial feel that the stroke took away their self agency and they have lost the person they once were, they feel not normal, not their normal selves. This loss of self results in emotional disequilibrium and a difficulty managing the impact of feelings which are more often negative and less often positive.

6.4.7 *Changes to Regaining Lost Self Theme Within the Timeframe of this Study*

Participants and their ttps spontaneously reflected on the way in which activation therapy had impacted on sense of self. They associated activation therapy with participants regaining self and being more of the person they were before therapy had started and this was seen as positive improvement. Another change that was identified over the course of the activation therapy trail was the way in which participants and their ttps talked about participants' emotional state, they described feelings of optimism and motivation and ttp 2 a3 suggested her husband was "a lot better in himself". In a rare type of word finding difficulty (Levelt 1991) p3 a2 combined the two words "hope" and "opening" into one when she talked about her thoughts about the therapy she had received. Her word "*hopening*" suggests that in some way attending a trial of aphasia therapy had resulted in a future in which positive feelings of hoping and opening had become conflated. p7's involvement in the project seemed to have precipitated a positive change in his outlook which he and his ttp both reflected on in their interviews.

"you know he's p7 the person rather than aphasic p7" ttp7 a3

"seemed to level out on a plane which I suppose is inevitable and this seems to have sort of picked him up and got him off to a new start" ttp7 a2

"it's it's (gestures up) going up again cause now you I mean you you know we've got you um uh have a PhD and I'm we're involved with that" p7 a3

Over the duration of the study, participants were described and described themselves as more confident and p2 with her word finding difficulties used the word strong to talk about how she felt that activation therapy had affected her. With hardly any access to spoken output, p1 also signalled how activation therapy had changed the way he felt when described himself as happier because of his participation in the therapy trial. In addition to an increase of reports about positive emotions there seemed to a reduction in some of the negative emotions associated with aphasia.

"(points at folder) that one (gestures turning pages) it um (curls biceps) strong (curls biceps) is strong" p3 a2

"p1	(looks at phone puts it down looks in pocket gets out bag gets out notebook)
interviewer	you can write on my paper so what was life like before the research project
p1	oh (draws unhappy face) oh
Interviewer	not happy
p1	yeah um (puts head in hands) yeah yeah
interviewer	pretty miserable
p1	yeah
interviewer	on the whole what percent miserable (draws an imaginary straight line from face to visual analogue scale)
p1	(draws an arrow horizontally then vertically up to 20%)
interviewer	about that percent miserable okay
p1	(signals enthusiasm to write draws happy face)
interviewer	and now
p1	(laughs)
interviewer	has it made you feel happier
p1	yeah
interviewer	has it really brilliant that much happier (draws an imaginary straight line from face to scale)
p1	(draws a line from happy face to 70%)
interviewer	what because we've been working on your talking
p1	yeah
interviewer	so it's made you go from there to there
p1	yeah (laughs)
interviewer	that's brilliant
p1	yeah" p1 a3

Participants and ttps suggested the course of the activation therapy trial was associated in participants thinking more. p1 remembered when he was due to come to activation therapy sessions and on these days would wake up early without needing to be reminded. ttp7 suggested that she felt that her partner was thinking more deeply and reflexively about things. This was also evident when ttp4's daughter described her mother's improved ability to self-regulate her emotions if she unintentionally expressed her irritability. p2 described not telling his wife about experiencing epileptic fits because he did not want to worry her. These changes in behaviour seem to signal a greater agency and sense of self efficacy that were associated with participating in the therapy trial.

"you get the feeling that the cogs are really sort of" ttp7 a2

"she'd be really snappy and irritable and not be aware that she's doing it. But she's not very often like that now she has the odd moment and she'll know how it came out wasn't the way she wanted it to come out and she sort of corrects herself really quickly definitely yeah definitely got better" ttp4 a3

The interviews seem to suggest that the activation therapy trial had a beneficial impact on how people with aphasia viewed themselves and how they were viewed by others. They stated that participants were more of themselves because of their participation in this project. Associated with this nebulous characterisation participants and ttps talked about positive emotions such as optimism and happiness and behaviours that were associated with greater self-awareness and taking more responsibility for themselves. For the participants and ttps in this trial, these changes signify a move towards the normal self that existed before aphasia happened.

6.4.8 *The Literature and Regaining Lost Self Theme*

Participants and ttps described changes in the way that participants viewed themselves, their emotional state and changed cognition over the course of the therapy trial. Shadden (2005) argued that language is essential to the ability to construct self. In that Aphasia constitutes a type of identity theft and PWA need to be helped to reconcile themselves to a post stroke self (Manning et al., 2019; Moss et al., 2021; Schiffrin, 1996; Shadden, 2005; Tanner, 2003). The way in which participants refer to regaining self, aligns closely with Shadden's work on aphasia and identity. However, neither participants or their ttps talked about PWA assimilating their new self and renegotiating identities post stroke. Rather ttps and participants with aphasia grieved for the normal future without aphasia which they had lost in much the same way that McLellan et al.'s (2013) Maori aphasia community had. Indeed, participants highlighted how they felt they were less the people they had been before. As Barrow (2008) suggested they conformed to the grand narrative of modern medicine and perceived aphasia as a problem that made them feel less than whole. Interviews suggest that in this case, even nearly fourteen years since the onset of aphasia, participants and ttps have not reconciled themselves to a post stroke identity and judge participants with aphasia by the people they used to be before they encountered aphasia. The way that participants perceived a positive change in regaining self over the course of the therapy trial was seen as a positive thing.

Living with aphasia is also associated with a disruption of emotional equilibrium which presents challenges to PWA and those that live with them. The aphasia literature has addressed the emotional consequences of stroke and aphasia in some depth. Depression (Baker et al., 2020a; Code and Herrmann, 2003; Liechty and Buchholz, 2006), being frightened (Le Dorze et al., 2014; Parr et al., 1997), distress (Hilari et al., 2021), anger (Liechty & Buchholz, 2006; Sorin Peters, 2003); sadness, grief and loss (Doughty Horn et al., 2016; Sorin Peters, 2003; Wray et al., 2018), loss of confidence (Manning et al., 2019; Moss et al., 2021), and frustration (Liechty & Buchholz, 2006) have all been identified as emotional consequences of stroke. To date there has been less discussion about how language loss might impact on the ability to manage sadness and depression even though as Code (2018) acknowledged performance in aphasia can be affected by emotional states such as stress and anxiety.

The participants in this study attest to the way in which emotions are central to the life of those living with aphasia and further research such as that conducted by Baker et al. (2020), Kneebone et al., (2016), Northcott et al., (2015), Thomas et al., (2012) may allow therapists to provide direct therapy for the emotional consequences of stroke. However, without this kind of direct intervention participants and ttps talked about positive changes in emotions over as almost a by-product of activation therapy. A literature review by Seeney (2021) suggested that only a few other impairment based therapies have been able to report this kind of positive evolution of emotional status associated with providing language based therapy interventions. Research by Berthier et al. (2020), Griffin-Musick et al., (2020) Mohr et al. (2017) suggests that the positive emotional impact of aphasia therapy can be measured using formal assessments such as The Stroke Aphasic Depression Questionnaire-21 (Lincoln et al., 2000; Berthier et al., 2020), Beck Depression Inventory (Beck, 1961; Mohr et al., 2017), and the Geriatric Depression Scale (Sheik & Yesavage, 1986; Griffin-Musick et al., 2020). This study adds another dimension to this evidence base from the perspective of personal experience. PWA and ttps suggested that intervention positively affected the negative feelings that might be associated with depression. They suggested that participation in the trial resulted in experiencing positive emotions, renewed motivation, and the ability to consider others.

6.4.9 *Alleviating Reliance on Close Others – Introduction*

The data collected showed that having aphasia affected not only people with aphasia but placed communicative, physical and emotional demands on those that cared for them. See Appendix 21 Summary of Issues Discussed and Their Translation into The Four Main Thematic Analysis Themes Talking is Better, Self, Close Others, Other Others for a summary of the issues that were discussed in interviews and how these issues were translated into the alleviating reliance of theme. Interviews suggested that ttps and participants acknowledged the imbalance in their relationship post aphasia and it seemed that both parties were aware of the way that PWA now relied heavily on their ttps, and for some ttps this reliance was apparent in every aspect of life. Participants with aphasia attempted to alleviate this reliance actively by providing labour within the household or family business. Within the timeframe of the study ttps seemed to identify changes in their partner with aphasia when they described increased activity within and outside of the home.

6.4.10 *Alleviating Reliance on Close Others - Theme*

Both PWA and their ttps described a life with aphasia that was less enriched by friends than it had been before aphasia and a life in which ttp1 described they were “stuck as a small community” a3. ttps accepted the consequences of stroke and spoke of their partners with respect, positivity and love. However, aphasia made life very difficult the partners of PWA both communicatively and emotionally. For two ttps, ttp5 and ttp2, this level of support was required alongside the need to work full time. These ttps in particular highlighted the negative impact that aphasia had on two way communication within a busy lifestyle and spoke of not having enough time to talk to their partners with aphasia, they spoke of feeling alone despite living side by side with their partners.

ttps referred to themselves as carers rather than partners, parents or children and described how they were needed to provide self-care, arrange appointments and act as advocates. ttp1 described his son's reliance on him for aspects of self-care such as taking off his son's electrocardiograph pads and ttp6 described the responsibility she felt when she had to attend her husband attend medical appointments with him and his lack of privacy because she had to do so.

Participants with aphasia seemed to have very little to occupy their time post stroke**.** ttps described their lives with PWA as environments they curated. In these carefully controlled settings, PWA lived alongside them and were allowed to live in a world where they could make their own choices, feel self-worth and self-determination. Sometimes PWA seemed to be aware that the level of support provided by their ttps was exceptional and something that they needed to redress in any way that they could even by performing household activities that others might find mundane. This willingness to be useful sometimes resulted in ttps having to obfuscate that help was not always helpful and ttp2 described how she regularly had to redo the dusting after her husband had gone to bed.

> "because we're looking after p1 so now it's seven days a week keeping an eye on him and making sure everything is provided in a manner that he can look as if he's independent uh I am as I said before reasonably confident that he can be independent but still have to text him every few hours to make sure he is okay when he's independent at present" ttp1 a1

6.4.11 *Changes to Reliance on Close Others Within the Timeframe of this Study*

Thematic analysis suggested that during the activation therapy trial ttps and PWA reported positive changes in the relationships of participants with aphasia and their close social sphere. ttps described how participants with aphasia were more willing to do things for themselves. ttp7 remarked that she had not had to make a phone call for her partner for ages. p3 told the interviewer that after twelve years of being her full time carer she now wanted her husband to go out to work and she was happy to be left in the house on her own. In fact, it seemed that she was looking forward to it.

“p3	union no um want ttp3 um (points to ttp3’s name written on a piece of paper) ttp3 (signals pushing) bye work yeah (wave then signals hold on with flat palm) five times
interviewer	five times
p3	no (signals hold on with flat palm)
interviewer	part time
p3	yeah” p3 a3

These reflections about a willingness to do things for themselves was associated with participants doing more activities. Ttp4’s daughter reflected that her mother was definitely less reliant on her, was doing more for herself and was even cooking Sunday dinner for her daughter and grandson. Other ttps described examples of participants with aphasia doing more than they had before the start of the therapy trial. P1 had started walking round the block on his own and shopping at the local shop without telling his parents. p2 had started to use a cash card to buy incidental shopping rather than relying on cash and p3 had started shopping for raw materials to make cards that she could make to give to others and to sell. These anecdotes all suggest that during a course of activation therapy participants with aphasia had become more willing to do new things and to engage in new past times,

> “um maybe nine months and it’s hit and miss it’s either really good or it’s really bad and I but he is making real good effort now and he’s started to help me um strip beds as well as he uses his teeth yesterday he asked me to show him how to use the washing machine and he’s never asked me that I don’t know think he can understand things more now we had people round for dinner the other day and he cooked I’ll give him ten out of ten beautiful dinner he cooked roast lamb potatoes roast parsnips three lots of vegetables and for four people he set the table and he put them in serving dishes and he was well chuffed with himself and he did that all on his own no help no nothing he spent all day trying to peel potatoes and things it takes a long while then he did it all he was real chuffed with himself” ttp1 a3

Participation in the activation therapy trial seemed to have positive associations. ttps and participants described the activation therapy trial as an enjoyable and rewarding thing to do in a life in which interaction with others was very limited. P3 described her response to the therapy trial by contrasting her uneventful life before her participation in the trial which was limited to watching television with the enjoyment she experienced attending activation therapy. According to ttp2 therapy had made a significant difference to their lives and when p6 was asked about what life was like now he said that he thought life was the same but the therapy trial had been an added ingredient, an additional part of his life post stroke.

"yeah it's walls caved in telly it's boring walls listen ooh nice (with emphasis) fantastic (thumbs up)" p3 a3

"um huh we were how I this huh it was the same as we doing it now but it's an i ingredient that we're now ingredient" p6 a3

ttps and PWA reported that participating in the therapy trial had been associated with participants' increased willingness to do things for themselves and participating in more activities. ttp1 encapsulated this feeling when he talked about the impact of therapy on his family and his son with aphasia, which suggested a less restricted future because they were able to start to looking outwards. These are positive changes that ttps and PWA thought about their lives and their relationships and suggest that attending activation therapy can impact on more than language function alone

"started doing that again taking p1 with us um so since before this therapy we were basically stuck as a small community going out trying to get therapies um now we can look outside a little bit further" ttp1 a3

The findings so far suggest that participating in this activation therapy trial changed how participants used language. It resulted in PWA being, or being perceived as, more of themselves. It also affected participants' willingness to do new things and do things by themselves. These changes, which may be considered fairly minor changes to those living without aphasia, such as making dinner, doing the housework, going out for a walk by yourself, being willing to be alone, doing something new, attending a therapy session by yourself, seemed to have great significance for the seven participants and seven ttps in this therapy trial. It represented subtle but important positive changes to the unequal balance within their relationships.

6.4.12 *The Literature and the Alleviating Reliance on Close Others Theme*

Thematic analysis findings (Braun & Clarke, 2006) suggested that aphasia changed relationships with close others. Participants with aphasia were described as needing a great deal of support from their small circle of close others. Participants talked about an existence in which they welcomed activity. Speech and Language Therapy sessions fulfilled the need for more people to interact with and also the need for something to do. Within the timespan of the therapy trial ttps and some participants described experiencing a newfound impetus that allowed them to look outside the environment in which they had felt trapped.

Research supports these views about the difficulties encountered by PWA and their close others. Christensen and Anderson (1989) highlighted that having aphasia affects all interactions and Kagan et al. (2004) emphasised the importance of the ability to have a conversation. The literature suggests that aphasia interferes with the ability to talk with others and living without language means that it is difficult to adapt and maintain relationships (Christensen & Anderson, 1989; Halle, 2011; Wallace et al., 2017; Wray et al., 2018). The effects of aphasia on close relationships has been well documented (Cruice et al., 2006; Winkler et al., 2014; McGurk and Kneebone 2013) and these difficulties occur irrespective of whether the relationship is one of wife and husband (Le Dorze et al., 2010), mother and daughter (Halle, 2011), or based on friendship alone (Davidson et al., 2008). Michallet et al. (2003) and Parr (2007) pointed out that this was particularly true for relationships with those with the severe aphasia.

The literature highlights that caring for someone with aphasia is hard and has an impact on those who live PWA who have to fulfil multiple roles (Shafer et al., 2019; Winkler et al., 2014) and provide practical and emotional support (Avent et al., 2005; Le Dorze et al., 2010: Moss et al., 2021). It also describes the burden of care (Moss et al., 2021) that is experienced by significant others, the way that people who live with PWA are often mentally and physically exhausted (Winkler et al., 2014) and sometimes resentful (Winkler et al., 2014). All ttps in this trial described some kind of third party disability that they associated with living with someone with aphasia (Grawburg et al., 2019).

Aphasia literature has identified that PWA tend to have small support networks (Cruice et al., 2006; Davidson et al., 2008; Grawburg et al., 2013; Vickers, 2010; Wray et al., 2018). Davidson et al. (2008) suggested that PWA benefitted from friendships with people who had time, humour and shared interests. The participants in this trial describe a core set of friends who had stayed loyal (Cruice et al., 2006). The interviews also indicate that people with aphasia needed to have activity (Cruice et al., 2006; Manning et al., 2019; Wray et al., 2018) and enjoy being with a trusted group of friends and relations (Kubina et al., 2013; Le Dorze and Brassard, 1995; Parr, 2007; Worrall et al., 2011).

Thematic analysis (Braun and Clarke, 2006) suggested that PWA appreciated being helpful and they demonstrated this helpfulness by providing household labour where possible (Dalemans et al., 2008; Hinckley, 2002; Niemi & Johansson, 2013; Wray et al., 2018) and helping the family (Manning et al., 2019). Finally, the inclusion of the aphasia therapist within this small circle of acquaintances was seen as a very welcome and positive ingredient in the lives of those living with aphasia. The therapy fulfilled a several benefits alongside providing impairment based activation therapy, it added another person to an already limited support network (Azios et al., 2020; Baker et al., 2020; Grohn et al., 2012; Moss et al., 2021; Northcutt et al., 2016) and provided another activity to do, which was in itself is rewarding (Barrow, 2008). It allowed the PWA to have an additional opportunity to engage in interpersonal communication (Legg et al., 2007) and receive the positive affirmation inherent in positive relationships with others (Pound, 2011) within a life post stroke which was bereft of other forms of long term professional support (Burton, 2000).

What is significant about the interviews conducted during this study is that ttps and participants talked about the concept of independence with subtle differences to the way that the concept is usually discussed in the aphasia literature. The aphasia literature usually describes the relationship between significant others and PWA using the terms dependence and independence (Brown et al., 2011i; Brown et al., 2012i; Cruice et al., 2010; Hilari et al., 2015; Herrmann & Wallesch, 1990; Manning et al., 2019; Pearl et al., 2011; Sarno, 1993; Tomkins et al, 2013; Wood et al., 2010). The choice of the alleviating reliance on close others theme label was motivated by the way that ttps and participants talked about their lives post stroke. PWA and ttps did not talk about a life that would return to how they lived before aphasia had happened, where a lack of dependence would be considered an indicator of living successfully with aphasia (Wray et al., 2018). Participants seemed to talk about relationships that would always be unequal but symbiotic. They talked about relationships in which people worked together to achieve the most rewarding life possible, a lifelong progression of positive changes within caring relationships which would result in ttps feeling less responsible for their partners with aphasia. This way of thinking about the relationship between PWA and their significant others seemed to be apparent, to some degree, in all of the relationships described in this study.

6.4.13 ***Re-engaging with Other Others - Introduction***

Re-engaging with other others is the fourth theme derived from this thematic analysis. It refers to the way in which PWA relate to people who are not within their immediate social sphere. PWA talked about the world outside their close constrained social circle as a place in which they did not feel comfortable and the feelings that they associated with their apartness from the other others were negative. ttps and PWA suggested that people without aphasia were in a position to ameliorate these difficulties but they did not. As a consequence of this lack of adaptation, PWA rejected those who rejected them. Participation in this therapy trial was associated with small but significant changes in the way that the seven participants with aphasia interacted with people they did not know. They talked about being more prepared to engage in conversations with the other others and they described occasions when they had started activities with other others and ttps described their partners as being more willing to try to be a part of what was going on in the "real world" ttp6 a2.

6.4.14 *Re-engaging with Other Others - Theme*

The ttps in this trial talked about a real world that was different to the place that participants with aphasia lived in. They referred to this world as the place that they wanted to get back to, a place in which they could be part of what's going on. ttps talked about a life in which participants did not have jobs and p5 suggested that even though she has a part of a job that she can do, she does not find it rewarding. ttps also described a life in which PWA found it hard to socialise and when ttps talked about their partners with aphasia not being able to work or be sociable, there is no equivocation that the reason for this difficulty is because PWA have problems communicating with other people.

Participants with aphasia suggested that when they thought about engaging with the real world they did not feel that this would be easy. p5 expressed his concern about not being equal enough to communicate with people he did not know with whilst p3 mimed that she was not confident when she was out in public.

"interviewer	he said you'd he'd like if you got more speech you could go out more
p3	kay
interviewer	did you think that
p3	yeah
interviewer	yeah and he said you'd be more outgoing if you had more speech less shy and on your own subdued you don't think you are
p3	um (shakes head gently)
interviewer	do you think you'd be more of a p3
p3	quiet (hunches shoulders)
interviewer	you're a bit quiet now then more quiet than you'd like to be
p3	mm (signals not sure) yes no yes no
interviewer	so sometimes you are sometimes you're not
p3	yeah
interviewer	does it depend where you are
p3	that one yes no yes no bum (hunches and looks down)
interviewer	so you're ok with your people you know
p3	yeah
interviewer	but with people you don't know it's not so good
p3	yeah" p3 a2

ttps and participants report an outside world in which people could and should be supportive of people with communication needs, but are not. P7 reported that he has difficulty communicating with people who do not have aphasia because people just "rabbit rabbit on" p7 a1, and his ttp supports his feelings of discomfort when communicating with others when she describes how he is able to communicate effectively with friends but less comfortable when he meets strangers. ttp5 and ttp6 suggest that the difficulties with socialising are exacerbated when there are different conversations happening at the same time.

ttps and PWA suggested that they did not feel supported when they talked to people in the wider community. They reported that some people in the wider community were helpful but others were not. It was not unusual for other people to ignore PWA or think that there was something wrong with them and ttp2 talked about people pushing her husband away because he could not talk. ttps and PWA suggested that other people may have reasons for their lack of friendliness and suggested that they might be embarrassed, frightened, bored or just did not understand what aphasia was. p5 pointed out the irony of her situation when she talked about her dilemma of whether to tell new acquaintances that she had aphasia because in her experience, telling or not telling people you have aphasia, results in a negative reaction. ttp7 suggested that people without aphasia needed to support PWA to accomplish what they needed to do and rather phlegmatically reported that they didn't. This was within the context of participants with aphasia who wanted to be involved in the life that they once had.

Participants and ttps reported that PWA felt rejected by the world that they didn't fit into and unsurprisingly participants with aphasia reacted to these feelings with by voicing their resigned acceptance of the situation. p3 signals waving goodbye to her friends post aphasia and p2 describes the rejection he feels when he is ignored when he is walking his dogs. Both participants with very little language relate how they choose to disregard people in the same way that they have been disregarded. The participants in this study appeared to reject those who have rejected them as if this reciprocal rejection helps them to cope with the lack of interaction with other others.

"p3	they've gone (gestures away)
interviewer	they've gone
p3	yeah
interviewer	gone
p3	(gestures away and tuts in disgust)
interviewer	yeah
p3	(gestures away) yeah (gestures away)

interviewer	yeah gone over your shoulder with it
p3	(waves bye)" p3 a1

"interviewer	she said people ignore you if you've got aphasia
p2	yeah
interviewer	yeah
p2	yeah walking the dogs (big circular motion and points to arm leg and mouth) yes and yes and yes
interviewer	it's alright walking the dogs but other people don't don't speak
p2	yeah it's one okay (signals hold on) oh bollocks bollocks
interviewer	yeah you say bollocks
p2	because it's it's oh (moves hand to signal go away) yeah sorry
interviewer	it's up to them
p2	sorry it's one okay oh bollocks it's one
interviewer	yeah you can't be bothered with it
p2	yeah" p2 a2

6.4.15 *Changes to the Re-engaging with Other Others Theme Within the Timeframe of this study*

Therapy experience interviews with participants with aphasia and their ttps suggested that there had been some positive changes in the way that PWA had acted and interacted with other others during the time they had been attending therapy. p4 described a recent change in her willingness to talk to others and described being more actively involved with conversations than she had been before.

"I'd listen to what they were saying and sometimes I'd say I agree with that and then sometimes I wouldn't you know I'd just made out that I didn't know anything and that's how it was for until just recently and coming out with a bit more" p4 a2

Participant described trying to do new things, making new friends and using strategies to allow them to interact in the context of their sometimes very severe language difficulties. ttp7 suggested that p7 was more adventurous than he had been in the past and p5 talked about some new friends that she had started to visit once a week, this was a new venture for her. p2's wife reported how her husband had overcome the difficulty of being ignored by strangers when he walked his dogs by strategising how to communicate with them. He had always had difficulty saying the names of his two dogs, but he now referred interested strangers to the newly engraved name tags around his dogs' necks. ttp two remarked that this had meant that people now talked to her husband and this had "brought him out" ttp7 a3

"(p7)pushes himself a bit more as far as the communication is concerned I mean not that he ever asked very much at all but he won't ask me to go up and ask for something quite so much I mean you know he'll say I'll go and get this he tried to do things but he doesn't oh can you ring up you do it better than me well I haven't done a phone call for him for ages now that's something he's very unsure of the x activity itself I mean he's aware that he's a novice um so he's going to be talking to strange people about aspects of life that he wants to learn about now I don't think he'd have done that a year ago honestly" ttp7 a3

"p5	um s s um name1 and name2 I I go g go there for two week two d days a week to see them
interviewer	are they your friends
p5	yeah (points over the road)
interviewer	over the road
p5	yeah
interviewer	and is that new since therapy or would did that always happen
p5	no now um now I can do that
interviewer	right
p5	because I can speak to them" p5 a3

6.4.16 *The Literature and Re-engaging with Other Others Theme*

The other others theme highlighted the way that PWA feel that they did not fit into the world that other people inhabit. They felt apart from the real world, felt they did not fit in and were not wanted and as a consequence of this lack of inclusion they had chosen to reject the world that did not make allowances for them. Within this inhospitable context, participants and ttps described changes to the way that they interacted with other others during the activation therapy trial. Instead of rejecting the society that rejected them, they related ways in which they had tried to re-engage and interact with people they did not know already. These infrequent but significant anecdotes suggest that attending activation therapy sessions was associated with positive changes in participants' ability to re-engage with other others.

Most authors agree that the lives of PWA are enriched by social support (Attard et al., 2015; Code, 2010; Elman, 2010: Liechty & Buchholz, 2006; Parr, 2007; Parr et al. 1997) and having a conversation with a person with aphasia should be seen as good fit between the person and their social environment (Worrall et al., 2007). However, aphasia means feeling stigmatised (Wray et al., 2018), isolated, apart from and uncomfortable in society (Elman et al. 2010; Hayward and Bixley, 2013; Parr et al., 1997). PWA report that when they come into contact with people without aphasia they are ignored, overlooked and invisible (Fotiadou et al., 2014), not listened to, not looked at, and corrected as if they were children (Howe et al., 2004). Garcia et al. (2000) and Northcutt and Hilari (2011) reported that PWA find that some people pity and patronise them and research by Fotiadou et al. (2014) suggested that PWA felt that people in the wider community thought they were not very clever and not very capable.

In 1998 Kagan argued very persuasively that a lack of inclusion leads to reduced communicative, mental and social health because PWA do not have the opportunity to meet with others and gain positive feedback through successful interaction (Fotiadou et al., 2014; Leg, 2007; Moss et al, 2021; Simmons-Mackie & Damico, 2011). Which means, in turn, PWA are less likely to venture into the outside world and have the opportunity for enriching their communicative, mental and social health, the cause produces the effect and the effect gives rise to the cause. Ultimately this cycle leads to the isolation and exclusion of PWA from the wider society (Code, 2010; Liechty & Buchholz, 2006; Parr, 2007). The PWA in this trial describe being unwanted and withdrew from the context they associated with these negative emotions (Fotiadou et al., 2014; Hersh, 2018). McGurk et al. (2011) described avoidance as a coping mechanism and it appears that the PWA in this trial used this strategy to avoid other others. In response to being rejected by society, they rejected society, reciprocal rejection.

The literature also supports the premise that PWA should have access to a supportive communicative environment in which other others have time and take the stance that PWA are competent, PWA have something to contribute and PWA can contribute to a cooperative and balanced conversation (Simmons-Mackie & Damico, 2007). But thematic analysis findings suggest that the other others generally don't, people without aphasia do not accommodate the needs of people without language (Napolitano, 1996; Simmons-Mackie & Damico, 2001; Threats, 2007; Tregaskis, 2002). Rather than supporting PWA, the other others marginalise them (Code et al., 2016; Bunning & Horton, 2007) and stigmatise their lack of language facility (Dalemans et al., 2010; Le Dorze & Brassard, 1995). If life and inclusion are viewed as a process of constant renegotiation (Raphael et al, 1995; Wray et al., 2018), PWA are disadvantaged because they do not have the facility to negotiate and renegotiate relationships in the way that they did before their stroke.

It has been suggested that people without aphasia do not know what aphasia is (Code et al., 2001; Flynn et al., 2009; McCann, 2013; Parr Byng Gilpin with Ireland 1997; Patterson et al., 2015) because it is an invisible unknown problem (Elman, 2010; Rose et al., 2003; Parr et al., 1997). Therefore, if more people knew more about aphasia, exclusion would reduce (Simmons-Mackie & Damico, 2007). Alternatively, people without aphasia could be trained to support the communication of those with aphasia using supported communication techniques (Howe et al., 2004; Raymer & Marshall, 2003). It seems that these schemes although very relevant (Hersh, 2018) have had very little impact on the lives of the people with aphasia in this clinical trial. Furthermore, the lack of focus on interacting with other others in aphasia outcomes (Wallace et al., 2019) and globally (Hersh, 2018) suggests that a collective amelioration of the impact of living with aphasia is some time away and unlikely to impact significantly on the lives of those living with aphasia today.

What is significant about the lived experiences reported by the seven PWA and their seven ttps during this therapy trial is that participating in this activation therapy trial was associated with positive changes in interaction with other others. Fotiadou et al. (2014) suggested that PWA were unlikely to initiate visiting friends and were more likely to receive visits from others. Participants in this therapy trial suggested that they had initiated visiting new found friends during the timeframe of this study. Simmons-Mackie and Damico (2007 p93; Van den Ven, 2005) suggested that PWA should not be passive recipients of exclusion. They suggested that individuals with aphasia needed to uphold their own communicative right to participate and develop new identities as communicators who have the right (Hammel et al., 2008) to be included in communicative events of their choice. Furthermore, Van den Ven (2005) suggested that PWA had a mutual responsibility to integrate with other others. It is significant that during this therapy trial participants with aphasia demonstrated more social agency and initiated more social contacts and individually felt able to accomplish what infrastructural initiatives, thus far, have not, greater inclusion.

6.4.17 *Thematic Analysis Summary*

In summary thematic analysis (Braun & Clarke, 2006) was used to represent an understanding of how seven participants with aphasia and their therapy trial partners construed their participation in an aphasia therapy trial. The thematic analysis process suggested that the impact of activation therapy could be explained using four main themes and one overarching theme. The overarching theme was that having aphasia affected every part of daily life and therefore any amelioration of its impact will be perceived as a positive thing. Analysis suggested that participants and ttps talked about the positive impact of therapy in four distinct ways talking is better, regaining lost self, alleviating reliance on close others and re-engaging with other others. This proposition is represented visually in Figure 6.3 Thematic Map of Participants' and ttps Perceptions of the Impact of Activation Therapy.

Thematic analysis (Braun & Clarke, 2006) has not been used before to understand the impact of an impairment based therapy for PWA and researchers have only infrequently tried to understand the qualitative aspect of participating in active word finding therapy (Devanga et al., 2021; Greenwood et al. 2010). This dearth of support for the qualitative benefits of therapy is the case even when the need for client involvement in their own health care is an acknowledged tenet of modern medicine (Department of Health, 2000, 2008; Frost & Ouellette, 2011; Kovarsky, 2008). In this context, the participants' voices still seem to be a missing element (Kovarsky & Curran, 2007; Tomkins et al., 2013; Wray et al., 2013) of aphasia therapy evaluations. This small scale investigation presents the views of the 14 people in this study and provides support for the premise that the impact of activation therapy can be described in terms of the positive impact on the lived experiences of those involved in the trial as well as the quantitative gains in word finding and noun phrase structure.

6.4.18 ***Trustworthiness of Thematic analysis***

Thematic analysis (Braun & Clarke, 2006) was not designed to debate the relative strengths of different explanations for lived experience phenomena, (see 6.5 Different Possible Interpretations for the Positive Impact of Attending the Activation Therapy Trial for a detailed discussion about this issue). Thematic analysis (Braun and Clarke, 2006) is about meaning making. It is an attempt to explain the impact of activation therapy on seven people with aphasia and their significant others in the context of an exploratory therapy trial. It attempts to interpret, create and tell the story of participating in an activation therapy trial by engaging the skill and theoretical attitudes of the analyst with the therapy experience data (Braun & Clarke, 2019).

In 1981 Guba wrote an influential paper about the criteria that could be used for assessing the trustworthiness of naturalistic inquiry. He proposed four naturalistic terms that he juxtaposed with terms synonymous with scientific rigor. These juxtapositions were credibility/internal validity, transferability/external validity, dependability/reliability, and confirmability/objectivity (Guba, 1981, p83). The qualitative strand of this study, adheres where possible, to the benchmarks set by Guba (1981) and are still used today to assess the trustworthiness of qualitative inquiry (Blom Johansson et al., 2012; Lawton et al., 2019; Moss et al. 2021; Niemi & Johansson, 2013; Shenton, 2004; Simmons-Mackie & Elman, 2011).

Guba (1981) suggested that credibility could be established if there was prolonged and persistent engagement with the data and if this engagement was recorded so that it could be reviewed in the future. Shenton (2004) further suggested that credibility could be achieved if the investigation reflected the reality of those it studied. To this end, the 40 interviews were conducted at three time points in the 21 week activation therapy trial (9 assessment sessions and 12 therapy sessions) constituting prolonged and persistent engagement. Each interview was video-taped and transcribed by the lead researcher, an experienced Speech and Language Therapist. A Speech and Language Therapy Undergraduate Frontrunner Student also transcribed all 40 interviews independently and then compared interview transcriptions to see if the transcriptions agreed with each other. The agreement for each participant's interviews ranged from 99.1% agreement (p5) and 99.7% (p1, p2 and p6) and the average agreement was 99.5%.

There were no member checks conducted during or after the therapy trial and if these had been conducted they would have added an extra layer to the studies' claims of credibility. However, in an attempt to address this shortcoming, the researcher shared her analysis with her PhD supervisors who also had access to the interview transcripts and theme tables from which the analysis was derived. PhD supervisors and Frontrunner students had oversight of the thematic analysis process and saw interview transcriptions, theme tables and drafts of the thematic analysis write up. PhD supervisors agreed that the final thematic map of the impact of activation therapy was a fair representation of the interviews conducted with the PWA and their ttps. These mechanisms increased the credibility of the qualitative interview analysis (Guba, 1981, Shenton, 2004).

The second naturalistic term Guba (1981) suggested, transferability, was juxtaposed with external validity. Shenton (2004), amongst others, suggested that any naturalistic inquiry is context bound and its findings may only be relevant to the particular area of investigation and therefore transferability may be a false construct. Ames et al. (2019) suggested that transferability may be established if there was thick data description and if sampling was purposive (Ames et al., 2019). In an attempt to address the transferability criteria, the participants in this study were drawn from a wide range of types and severities of aphasia, two genders were represented and participants were recruited from a range of ages and socioeconomic groups. Individual characteristics are presented in Table 3.2 Participant and Therapy Trial Partner Biographical Data. This description encourages comparison to other people living with aphasia and suggests that similar people might benefit from participating in an activation therapy trial. However, despite this purposive sampling, participants were drawn from a single geographical area and a single ethnicity and for this reason the findings of the study are context relevant and the study needs to be replicated in different and diverse contexts.

Guba (1981) equated dependability with reliability and suggested qualitative inquiry should use different but overlapping methods, multiple researchers and audit trails to enhance the dependability of a study. Shenton (2004) suggested that achieving dependability in a qualitative study was hard but the researcher should attempt to leave an audit trail that was detailed enough for another researcher to repeat the study. The thematic analysis process (Braun & Clarke, 2006) used in this study is described in detail in 6.3 Thematic Analysis Process and included videos of interviews, interview transcriptions (see Table 5.4 Example of Transcription taken from p5's a2 Interview), code maps of each interview (Figure 6.1 Graphic representation of the code map produced after p2's a3 interview) and a journal entry for each interview.

The journal entries included a summary of the codes for each interview, a summary of the pragmatic interactions used by PWA and an ever evolving diagram that summarised the way in which the current interview could be understood in the context of the interviews that had preceded it (see Figure 6.2 Graphic representation of a diagram created after p7's a2 interview). This information was then translated into the four theme tables that are presented in Appendix 21 Summary of Issues Discussed and Their Translation into The Four Main Thematic Analysis Themes Talking is Better, Self, Close Others, Other Others and the final diagram that was created to explain how the seven PWA and their ttps understood the impact of activation therapy (see Figure 6.3 Thematic Map of Participants' and ttps Perceptions of the Impact of Activation Therapy). Guba (1981) would suggest that this detailed audit trail contributes positively to the dependability of this study.

The last factor Guba (1981) used to describe the way in which naturalistic inquiry could be evaluated was confirmability and he suggested that this term meant that findings were free from investigator bias. He suggested that triangulation and reflexivity could be used to ameliorate the impact of bias. Triangulation of findings was achieved in the way that the study was conceptualised to evaluate the impact of activation therapy from three perspectives (see 3.2 Concurrent Mixed Two Method Data Collection and Three Method Data Analysis Research Design Used in this Activation Therapy Trial) and the final part of this chapter will be used to interpret and explain the convergence and or divergence of results and integrate findings through a triangulation and integration of findings (see 6.8 Triangulation of the Mixed Methods Qualitative and Quantitative Data Analyses and 6.10 Integration of the Mixed Methods Qualitative and Quantitative Data Analyses)

It seems that the potential threat of investigator bias is an unavoidable part of qualitative inquiry (Charmaz, 2006) and this is an acknowledged limitation of this study. If one accepts that the analyst's background cannot be considered neutral my values and subjective cultural and contextual experiences must have coloured the way in which I approached the analysis (Braun and Clarke, 2006; Graneheim and Lundman, 2002). Within this small scale research project there was another greater challenge to the thematic analysis process. I was the person who conceived the project, the researcher, the therapist, the interviewer, and the analyst and therefore my bias is apparent in the design and analyses of the whole project. Whilst the challenge of bias can be mitigated against in larger team based projects by separating each of these roles, this partitioning was not possible in this research project.

Tufford and Newman (2010) suggested that a careful, thoughtful, honest and reflexive engagement with qualitative data may help the researcher to reflect accurately the views of those being studied rather than a way of presenting information through the lens of bias. Elliot, Fisher and Rennie (1999) suggested that a researcher who acknowledged their perspective may, in some way, mitigate against inherent bias and it was important that I tried to lessen its impact by reflecting on my practice (Conneeley, 2002; McCorquodale & Kinsella, 2015) and acknowledging my role within the research process as active and the opposite of inert (Mark et al, 2007). With these caveats in place Attride-Sterling (2001) suggests that an analyst who clearly explains their background, their processes and produces methodical and rigorous analyses can attempt to explain and interpret the perspectives of other people.

Reflexivity means to understand the role of the researcher in the research process (Guba, 1981; Ruby, 1980) and by explaining my perspective to myself and others I hope to be able to represent the meaning of activation therapy from the perspectives of those taking part and not my own. I am a, white woman, born in Scotland, living in england, a wife, mother, daughter of a father and mother with acquired language problems, a researcher, Speech and Language Therapist and Senior Lecturer, I cannot come to the process of investigating activation therapy and using thematic analysis, without prior opinions and prejudices (Braun and Clarke, 2006; Downe-Wamboldt, 1992; Graneheim and Lundman, 2004)

Firstly, as the researcher analyst, I want this research project to be successful, so I will be sensitive to research designs and data that reflect this position. As a Speech and Language Therapist who has worked in the profession for 36 years, I have held the belief that impairment based therapy can reduce the impact of aphasia. As a lecturer I teach students about how to provide aphasia therapy and how to measure outcome. As a daughter of a father and mother with acquired language difficulties I have lived the life of a ttp. Reconciling the dissonance between my professional and personal viewpoints has been part of the learning that has occurred during this PhD (Rolls & Relf, 2006).

The choice of thematic analysis (Braun and Clarke, 2006) was made because its processes result in a clear audit trail that can be used to oversee what is being done and what has been done. The iterative process of conducting interviews, designing a set of ten non directive interview questions, the researcher conducting transcription, interview coding, memo making, diagram creation and reconceptualization underpin the thematic analysis process was transparent, grounded in the data and trustworthy. Lastly the constant supervision of supervisors, examiners, and joint working with frontrunners allowed the discussion of what the data meant to the people who talked in the interviews. These discussions led to greater reflexivity and data checking to ensure that, as closely as possible, the data represented the views of the seven people with aphasia and their clinical trial partners rather than the researcher's biases (Shenton, p2004, p72)

6.5 Different Possible Interpretations for the Positive Impact of Attending the Activation Therapy Trial

If one adopts the lens of naturalistic inquiry, the trustworthiness of the data analysis process leads to the story of the way that activation therapy had impacted on the seven participants with aphasia and their ttps. Furthermore qualitative inquiry should not be evaluated using the vocabulary and conceptual framework that scientific inquiry dictates but this means that its findings may not accepted because they lack acceptability, reliability and validity; namely psychometric quality (Pritchard et al., 2018). Both the views of those that were interviewed and the analysis are subjective and critics could suggest that the impact of activation therapy described previously in this chapter could be attributed to something other than therapy itself.

Participants with aphasia and their ttps suggested that they thought that activation therapy improved functional language skills. This outcome has been referred to as the primary focus for aphasia therapy (Brady et al., 2016) and a desirable impact of aphasia therapy (Boyle, 2004; Carragher et al., 2015; Davidson et al. 2003; Del Toro, 2008; Doyle, 1995; Edwards, 1987; Frattali, 1992; Kagan, 2004; Maddy et al., 2014; Prins and Bastiaanse, 2004; Seron, 1979; Schuell and Jenkins, 1961). The qualitative findings of this study also suggested that participation in the activation therapy trial had been associated with positive changes in relationships with self, close others and other others and this finding is not common in the literature (Devanga, 2021 et al; Greenwood et al., 2010).

Alongside the paucity of but relevant findings about the impact of face to face aphasia therapy on the lives of those living with aphasia; it is important to consider the notion that the enactment of activation therapy had many and various components. First participants and ttps were involved in attending and participating in a meaningful social activity once a week for 21 weeks. They had to negotiate the vagaries of navigating themselves to the therapy room, participating in therapy, and then finding their way back home again whilst engaging with all of the organisational and social consequences of doing so. Their compliance in the 21 week therapy trial also signalled a belief in its benefits and an implicit acknowledgement attending the activation therapy trial was not a waste of their time (Wigfield & Cambria, 2010).

Different authors have suggested various reasons to explain why research participants may feel that therapy has benefitted them and these reasons are listed in Table 6.2 Different Possible Theoretical Explanations for the Quality of Life Gains Associated with Participation in the Activation Therapy Trial. It would be very hard to differentiate between the specific impact of activation therapy and the indirect impact of the enactment of participating in a therapy trial and it would be hard to argue against any of these indirect benefits of attending the activation therapy trial. This criticism however, could be levelled at any type of contact with a healthcare practitioner that includes attendance at a healthcare centre and receiving a course of intervention. It may be relevant to think that inherent in addition to the direct benefits of the intervention itself, any healthcare intervention also has indirect effects.

Table 6.2

Different Possible Theoretical Explanations for the Positive Changes Associated with Participation in the Activation Therapy Trial

author	year	effect
Parr et al.	1997	spirit of hopefulness that accompanies therapy
Kagan	1998	reducing social isolation
Simmons Mackie & Damico	2001	interviews as a type of talking therapy
Moerman and Jonas	2002	meaning response active therapeutic effect of placebo
Wade et al.	2003	increases in self-esteem and confidence impact on functional communication
O'Connor et al.	2007	receiving attention
Barrow	2008	therapy as activity
Kaptchuk et al.	2008	placebo effect
Kaptchuk et al.	2008	supportive patient-practitioner relationship
Le Dorze and Signori	2009	care giver support
Harding et al.	2010	a wish to please the therapist
Wigfield & Cambria	2010	achievement motivation
Isaksen	2014	being involved in outcome measurement increases client satisfaction
Bright et al.	2015	patient engagement
Lawton et al.	2019	therapeutic alliance

Whilst acknowledging that the impact of a therapy trial might include benefits beyond participation in the therapy activity itself, it is also relevant to consider the differential distribution of its impact. Control word finding and control language and cognitive assessment results did not find the same level of improvement as the words targeted within activation therapy. This specific impact suggests that the general benefits of attending a course aphasia therapy unquestionably exists (see Table 6.2 Different Possible Theoretical Explanations for the Positive Changes Associated with Participation in the Activation Therapy Trial) but the impact of activation therapy is measurably and significantly different (Galton, 1879: Pritchard et al., 2018) for stimuli that have been targeted in therapy when compared to those that were not. This differential impact argues for the premise that activation therapy had a specific impact on the words targeted in therapy which was specific and different and therefore could not be attributed to the benefits of participating in a generic therapy trial.

6.6 Thematic Analysis - Possible Clinical Applications and Clinical Considerations

This research project is only one of three to record qualitative improvements in feelings about living with aphasia as part of the benefits of attending a direct word finding therapy trial (Devanga et al., 2021; Greenwood et al., 2010). Thematic analysis suggested that there are key aspects of living with aphasia that can be affected by attending a course of impairment based activation therapy, talking is better and relationships with self, close others and other others improve. Reports of these different types of impact alongside measurable improvement of word finding following a course of activation therapy suggests that aphasia therapy should be a priority for Speech and Language Therapy Services especially in view of the limited opportunities to provide intervention for PWA and their significant others (see 2.2.1 The World Health Organisation and the National Health Service).

The thematic analysis (Braun and Clarke, 2006) used in this research project was inductive and involved a limited sample of PWA and their ttps suggested. However, thematic analysis can also be also be deductive (Braun and Clarke, 2006) and deductive analysis has the advantage of being clinically accessible and clinically relevant. Clinically feasible because conversations with PWA and their ttps are part of everyday clinical practice (Bixley et al., 2012, 2014; Shrubsole et al., 2017; Simmons-Mackie et al., 2016, Simmons-Mackie et al. 2020) and clinically relevant because they identify much needed personally relevant information (Department of Health, 2000, 2008; Frost & Ouellette, 2011) about the impact of aphasia that may be missed using more psychometrically stringent and brief assessments of the qualitative experience of living with aphasia (Enderby et al., 2006; Hilari et al., 2009).

This small scale research project has suggested that a limited sample of PWA and their ttps associated changes in the impact of aphasia on four areas in their lives, talking is better, improved relationships with self, others and other others. If these themes were used to guide a deductive online deductive analysis every time a conversation happens in the therapy room, they may provide a framework to capture the narratives of PWA and their significant others of how attending Speech and Language Therapy intervention might be associated with positive changes in the experience of living with aphasia. In reality, this is the evidence that clinicians gather in clinical practice during everyday conversations in which they have very limited time to spend with their client (Code & Heron, 2003). Deductive interviews could be used as a qualitative outcome measures to describe the positive benefits of aphasia therapy especially as Kondracki et al. (2002) suggest that deductive analysis (Braun & Clarke, 2006) is particularly useful for identifying changes over time.

Online deductive analysis of interviews could also be used to establish authentic speech centred goals (Evans, 2012; Day & Tosey, 2011; Siegert & Taylor, 2004; Sorin Peters, 2003; Turner Stokes, 2009; Worrall et al., 2011). It is very difficult to identify what is important to someone without language. Research by Wallace et al. (2017) highlighted the difficulty of identifying therapy goals that meet the need of those receiving therapy for communication difficulties. It may be that listening to the views of PWA and their close others within semi structured everyday clinical interviews might facilitate the process of arriving at personally relevant but theoretically congruent therapy goals.

It is important to note that there were examples of participants who found the process of therapy very tiring and the two participants who did not complete the trial found the active process of engagement in the activation therapy trail too onerous to continue with it. These instances suggest that active impairment therapy may not be the best way to help PWA live with their aphasia and this level of detail may not be available to a therapist who relies on generic assessments to investigate the experience of living with aphasia.

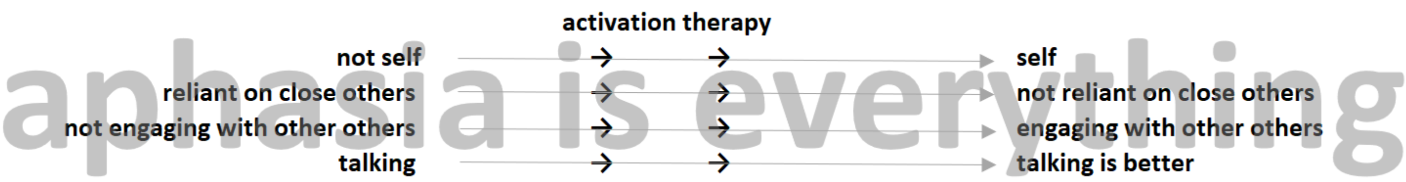
This study provides some limited support for the proposition that therapy is valuable to PWA and their significant others. At best, its four main themes can be used as theoretical reference to guide online deductive analysis of individual changes in talking, relationships with self, close others during therapy sessions. At worst it may give therapists the confidence to note and prioritise the missing voice of evidence based practice (Kovarsky & Curran, 2007) as part of everyday clinical practice.

6.7 Thematic Analysis Conclusions

In this part of the research study, thematic analysis (Braun and Clarke, 2006) was used to investigate the participants' and ttps' views about the impact of activation therapy. Transparent systematic and auditable processes (Braun and Clarke, 2006; Guba 1981) were used and allow the reader to evaluate this research project, improve on it (Attride-Stirling, 2001) and compare it to other work that attempts to evaluate the impact of activation therapy for PWA. Reports of improvements in the lived experience suggest that PWA and their ttps subjectively assessed the impact of activation therapy as beneficial. It changed the way that participants used language and had a positive impact on the relationships that PWA had with themselves, close others and other others.

Figure 6.3

Thematic Map of Participants' and ttps Perceptions of the Impact of Activation Therapy



The importance of these changes need to be considered in the context of what this means to the people who were kind enough to participate in this study, those who had been being “left in a wilderness without communication” ttp7 a1. To them it means everything. Throughout the interviews, participants and their ttps made direct links between aphasia and the way in which affected their lived experience. Pre-therapy descriptions and post therapy reflections highlighted the relationship between communication and every aspect of life. They also attest to the subjective value of twelve weeks of activation therapy and its role in the lives of the seven participants with aphasia and their ttps.

6.8 Triangulation of the Mixed Methods Qualitative and Quantitative Data Analyses

This therapy trial used a combination of methods to study the impact of activation therapy with and without word finding and each method showed a benefit for the person living with aphasia. Activation therapy resulted in improved word finding skills, longer noun phrases, better communication skills and improved personal wellbeing and social relationships. It has been suggested that conclusions are more convincing when two or more methods arrive at the same findings and this convergence of evidence has been called triangulation (Bouchard, 1976; Campbell and Fiske, 1959; Denzin, 1978; Jick, 1979; Plano Clarke & Creswell, 2008; Timans et al., 2019).

Triangulation overcomes the weakness that is inherent in each individual evaluation method. Aphasia therapy research acknowledges that word finding therapy should have an impact on real life communication (Boyle, 2004; Carragher et al., 2015; Davidson et al. 2003; Del Toro, 2008; Doyle, 1995; Edwards, 1987; Frattali, 1992; Kagan, 2004; Maddy et al., 2014; Prins and Bastiaanse, 2004; Seron, 1979; Schuell and Jenkins, 1961) but even though it is widely acknowledged that all aphasia therapy needs to have an impact on everyday conversations and a positive impact on the life of the person with aphasia (Best et al. 2008; Kagan, 2008; Ross & Wertz, 2010; Marshall, 2005), very few aphasia therapy studies have provided evidence to support the premise that word finding therapy has a wider impact on the PWA than improved word finding alone.

Word finding assessments, grammatical analysis and thematic analysis have been used to gather a detailed and wide ranging picture of the impact of activation therapy and represent a triangulation of evidence to support the implementation of an impairment based therapy. Furthermore, whilst there are challenges to using these approaches in parallel, it could be argued that no single method could demonstrate these three complementary outcomes. Each method and its findings are relevant to the study. Combining results from observable behaviours and perceptions drawn from personal experiences suggests that activation therapy is worth the effort, time and money involved in its delivery (Darley, 1972) and its impact is holistically beneficial (Enderby & Emerson, 1995) to those who participated in this therapy trial.

6.10 Integration of the Mixed Methods Qualitative and Quantitative Data Analyses

A concurrent mixed methods design is one in which two or more different methods are used to cross validate or corroborate findings within a single study (Creswell et al., 2008; Green et al., 1989; Morgan, 1998; Simmons-Mackie and Damico, 2001; Steckler et al., 1992; Teddlie & Yu, 2007). In a concurrent research design, different methods are used to offset the methodological weaknesses of one design with the strengths of the other. In this current study, each method was used to explore the impact of one aspect of activation therapy and triangulation was used to explain how they corroborated each other.

Gutterman et al. (2015) suggested that there could be another aspect of the final analyses of a mixed methods design and refer to this as the process of integration. Fetters et al. (2013) reviewed the way that people used mixed method research designs and concluded that integration was an underused aspect of mixed methods which researchers could use to understand the data beyond reporting the results of each method separately then triangulating and summarising where the methods confirmed each other or were discordant.

Furthermore, Fetters et al. (2013) proposed that integration could be accomplished through a combined narrative and visual display at the end of a mixed methods investigation and to this end the final part of this thematic analysis chapter will present a narrative and visual representation of how the findings from the three methods provide support for an integrated finding and will argue that participating in this activation therapy trail affected the way in which PWA accessed nouns and noun syntax and this change in accessibility of nouns and noun syntax resulted in reported functional language and experiential life gains. The visual representation of this proposition can be found in Figure 6.4 Visual Representation the Integrated Mixed Methods Evaluation of the Impact of Activation Therapy.

This integrated diagram uses colour to represent the three methods used in this study, pink for the word finding assessments, green for the grammatical analyses and blue for the qualitative interviews. Findings have been integrated for each participant and all participants. This integration seems to suggest that activation therapy resulted in better noun word finding for the words targeted in therapy and this translated into their use in spontaneous language in therapy experience interviews. Improved ability to use noun syntax post therapy was evident in the ability to use longer noun phrases and a better ability to self-cue using noun collocations. Lastly therapy experience interview narratives suggested that participants demonstrated improved access to words and sentence structure in every day talk.

Figure 6.4

Visual Representation the Integrated Mixed Methods Evaluation of the Impact of Activation Therapy

	word finding assessments			grammatical analysis	interviews
	found more therapy words	used therapy words in interviews	used more collocation self cueing	used longer noun phrases	reports of better word finding and better sentence structure
p1	2.33	flower a2		0-1	ttp 1 a3 in fact he has great difficulty putting two words together but this morning morning was almost perfect the morag was a lot more difficult um so I know things have advanced
p2	1.33	bed and television a2		2-3	ttp2 a3 well he came out with two sentences he does come out with occasional sentences how do you do how are you things like that but he came out with three sentences I was in the kitchen you just click on it oh blimey
p3	5	house a3	0-3	2-3	ttp 3 a2 one off words that I though blimey I never heard you use that one before where did that one come from
p4	6	television a2		2-4	p4 a2 it's a bit easier now to a certain extent cause certain things I can repeat to my next door neighbour about coming here
p5	17	rhinocerous a2	0-3	2-4	p5 a2 um these word I think some of them I can't can't get but the others I can the words get better
p6	7.34	heart a2	10-24	3-5	ttp6 a3 but it seems to be the sentence structure that seems to be improving
p7	14.67			3-6	ttp7 a2 he tries to string things together better

This juxtaposition of impacts across methods and participants represents an integrated finding which would not have been apparent if only monomethod research had been used and if only triangulation had been applied to the data. This is the final argument that this exploratory study proposes. It will needs replication and further investigation but it suggests that activation therapy may have addressed not only the words targeted in therapy but also made changes to the accessibility of nouns and underlying noun syntax and this impact was apparent in the spontaneous output of the seven participants in this trial.

This argument fits well with linguistic theory that suggest that the potential to produce longer noun phrases is an indicator of linguistic maturity or complexity (Crystal, 1982) and it may be that in a therapy trial that focuses on improving access to nouns, access to the underlying noun phrase syntactical framework is also facilitated as part of the process. The finding also fits well with linguistic theory that suggests syntactic and word level information are inextricably linked together and therefore accessing word level representations will also have an impact on accessing syntactical information (Dell & O'Seaghdha, 1991; Herbert et al., 2014; Levelt et al., 1991; Levelt et al., 1999; Schriefers, 1993). Retrospectively, this theoretical explanation for the change that has been identified in this project, might fulfil Webster et al.'s (2015) imperative to understand how across level generalisation might occur. It may also address Baker's (2012) priority for identifying the active ingredients in therapy as these integrated findings suggest that the active ingredient of activation therapy was the repeated access of specific nouns and noun syntax and the impact of this repeated access to a restricted set of words generalised to other words from the same syntactic and conceptual category.

Chapter 7 General Discussion and Conclusions

7.1 Introduction to the General Discussion and Conclusions Chapter

This thesis will now focus on the final chapter. It follows the thematic results chapter which examined the lived experience of attending the activation therapy trial. It concluded with a triangulation and integration of the three research methods, word finding assessment results, grammatical analysis results or thematic analysis findings, which suggested that activation therapy had an impact on the accessibility of nouns and noun syntax. This final chapter will begin with a summary of the key findings of this project which will then be followed by a discussion of its limitations. The next part of this final chapter will examine topics that are relevant to the current research but were not specific to any specific results chapter. These discussion points will consider, the control measures that were used in the study (7.4 Control Measures), 7.5 Severity Ratings, 7.6 Localisationist Diagnosis, 7.7 Aphasia Therapy is a Scarce Resource, 7.8 Therapy is Tiring, 7.9 Vocabulary Choice and 7.10 Role of the Researcher in Quantitative Analysis. The penultimate parts of this chapter will explore ways in which this research project could be used as the basis for future research and further analysis of data. It will also provide a summary of the ways in which activation therapy and the methods that were used to evaluate its impact can be used in aphasia therapy practice. The last part of this chapter will conclude with a final summary of what this research project aimed to accomplish and a closing summary of its findings.

7.2 Key Findings

The key finding of this therapy trial was that activation therapy was beneficial for the seven participants with aphasia and their activation therapy trial partners and this finding was consistent across the qualitative and quantitative component of the research project. The research addressed and met the four aims and objectives of the project and found that activation therapy was successful whether or not it included active spoken word finding practice. The reported benefits of participation in the activation therapy trial appeared to show significant improvements in wellbeing for people with different severities of aphasia and their close family members. Quantitative measurements of improved word finding, being able to produce longer noun phrases combined with qualitative reports of increased quality of life dimension attest to the relevance of activation therapy for people who want to participate in language based aphasia rehabilitation. Its integrated findings which incorporated findings from all three methods suggested that attending the activation therapy trail may have had a specific beneficial impact on accessing nouns and noun syntax accessing. The results of this study are exploratory and preliminary but they could be used to add to the evidence base that supports the implementation of impairment based therapy for those with aphasia post stroke because its findings suggest that this innovative activation therapy technique benefits both the language skills and the life experience of those living with aphasia.

The first method used to evaluate the impact of activation therapy was word finding assessment. Word finding skills for words used in therapy were compared to a no therapy control group of words and two other within subject control measures (The Test for the Reception of Grammar 2, Bishop, 2003; The Standard Progressive Matrices, Raven, 2006). Words which had received activation therapy were more likely to be accessed in tests of spoken word finding than words which had not been used in therapy. The lack of comparable improvements and stability of control assessments suggested that the impact of activation therapy was specific and could not be attributed to generalised improvement in brain function or improvements in feelings of wellbeing (Darley 1972; see also Howard, 1986; Kazdin, 1992; LaPointe, 1977; McNeil et al., 2011; Pring, 2004).

This finding implies that spoken word finding practice is not essential for the success of aphasia rehabilitation. What appears to be integral to the success of activation therapy is that PWA have the opportunity to access word representations and think about their meaning. The links between underlying representations are strengthened by activating their meaning and activating corresponding syntactic and phonological information. The process of representation wide activation results in the words being more accessible when they are stimulated again. The results of this study suggest that practising saying a word out loud does not appear to have any more impact on the process of spoken word finding than activating and iterating the connections between meaning, syntax and sound representations.

Within level generalisation (Webster et al., 2015) was evident for all participants and this thesis argued that the reason for this positive change in word finding skills post therapy could be that the words in the Snodgrass and Vanderwart (1980) therapy set could represent a fuzzy category of words (Funnell & Sheridan, 1992; Gardner, 1973; Kiran et al., 2011; Warrington 1981). Words within this category share the same features (Dell & O'Seaghdha, 1991) which means that the process of accessing words for therapy may impact on words not targeted for therapy. This in because activation therapy stimulates features which may be shared by other words and the improvement in accessing a single feature will have a cumulative effect on all concepts that recruit it (Dell & O'Seaghdha, 1991). Alternatively, accessing one word and distinguishing it from its closely related neighbours will make them more accessible the next time either of these are stimulated in word finding tasks (Dell & O'Seaghdha, 1991; Levelt et al., 1991; Howard, 2000). Finally, alongside the impact that activation therapy has on the target word itself, hearing and activating closely connected words as part the activation therapy technique may result in better connectivity within related word representations. All of these explanations could provide a rationale for the therapy specific and generalised impact of activation therapy because all participants in the trial had some degree of meaning accessing difficulty that might respond to enhanced access to meaning through the activation therapy technique.

This thesis has argued that participants demonstrated knowledge about noun syntax when they experienced difficulties finding words and sometime the data demonstrated that knowledge was specific to the word that they were trying to find. All participants showed either syntactical or collocation self cueing during word finding assessments which suggested that on some occasions, participants were able to access intact noun syntax to aid word finding skills and this ability was more explicable using the theories proposed by non-linear word processing models in which accessing from different levels can summate and result in successful word finding (Dell & O'Seaghdha, 1991. The data also showed that after therapy participants self cued themselves into finding problematic words by listing the target word's associations. This overcoming word finding difficulties by adopting a strategy is a welcome by-product of activation therapy and one which is not routinely reported in the literature (Bruce & Howard, 1988; Wambaugh et al., 2013).

The second method used to evaluate the impact of activation therapy was the grammatical analysis of comparable extracts of participant therapy experience interviews. One indicator reliably differentiated between language used in pre and post therapy interviews and this was the length of noun phrase. All participants used longer noun phrases after twelve weeks of activation therapy. Participants also used less redundant non propositional language in interviews following activation therapy without word finding. Their post activation therapy without word finding contained more phrases and fewer words such as exclamations, fillers such as um, incomplete words, and yes and no responses. Meaningful words replaced words that had less meaning and this improvement was not observed after therapy in which participants had practised spoken with word finding.

The thesis has also proposed that comparing word type usage, lexical diversity, use of phrase and clause structure may not be relevant when measuring spontaneous language use in this context because competency does not always equate with linguistic complexity. This is particularly the case for non-task specific language. The thesis has argued that noun phrase length may be a more relevant indicator of change because it occurred for all participants with different types and degrees of aphasia and is a skill that might be evident in any linguistic context, but may be most particularly relevant for the evaluation of improvements in spontaneous speech.

Thematic analysis was the third method used to evaluate the psychological effect of activation therapy. This is the first time that thematic analysis has been used to assess the impact of an impairment based aphasia therapy. The process involved conceptualising what participants and their ttps thought about living with aphasia and how they viewed the way that participating in the activation therapy trial had affected their lives. Participants and their ttps represented their perception that activation therapy had impacted positively on their ability to talk. Alongside changes in language skills, participants and ttps suggested that their involvement in this therapy trial had improved their lives for the better. Therapy was associated with PWA regaining some of their former self, alleviating reliance on close others and a readiness to re-engage with the wider community which had previously been perceived as hostile. These changes were attributed directly to participation in the activation therapy trial.

This thesis has presented a summary of a range of benefits that could be associated with attending any healthcare intervention and has acknowledged that these benefits may have contributed to the perceived positive impact of activation therapy. However, as these benefits will be present in any healthcare setting, this thesis has argued that they are an ever present addendum to any intervention event (Baker, 2012) and almost certainly contributed to the success of this trial. However, this thesis has argued that these benefits applied differentially to words targeted in therapy and to words and assessments which did not benefit from the same attention and it has been argued that this differential impact suggests a benefit of activation therapy over and above any benefit that might happen because of attending a therapy trial.

7.3 Limitations

This thesis has argued that activation therapy has beneficial impact on the PWA's word finding, accessibility to noun syntax and perceptions of well-being and where possible the study followed guidance about how to achieve a better quality of research design. The limitations of this study have been discussed in the chapters in which they were most relevant 4.12 Procedures used to Reduce the Possible Impact of Bias - Word Finding Assessments, 5.7 Procedures used to Reduce the Possible Impact of Bias, Grammatical Analysis, and 6.4.18 Trustworthiness of Thematic analysis. Consideration of the limitations of the current trial informed the potential design of a future research project designed to overcome the limitations of the current study, the design of this study is outlined in 7.11 Further Research Directions.

The quality indicators that were incorporated into the design of this research project were also presented in the chapter where they were most relevant, Chapter 3 Methodology, Chapter 4 Word Finding Assessment Results, Chapter 5 Grammatical Analysis Results and Chapter 6 Thematic analysis Findings. The quality indicators that were integrated into this mixed methods research design were taken from six different quality checklists, The Cochrane Review Study Characteristics Categories (Brady et al., 2016), Critical Appraisal Skills Programme Randomised Controlled Trials Checklist (2020), Critical Appraisal Skills Programme Qualitative Checklist (2020), Consolidated

Standards of Reporting Trials (Moher et al., 2001), Physiotherapy Evidence Database Scale (Maher et al., 2003), Single-Case Experimental Design Scale (Tate et al., 2008) and the Template for Intervention Description and Replication Checklist (Hoffman et al., 2014). Table 7.1 Comparison of Quality Indicators Incorporated into the Current Study and Six Quality Checklists indicates where the current research design incorporated one of these quality indicators and where it did not.

Table 7.1

Comparison of Quality Indicators Incorporated into the Current Study and Six Quality Checklists

variable	atherapy	Cochrane	CASP RCT	CASP QUAL	CONSORT	PEDro	SCED	TIDieR
brief name	✓							✓
abstract	✓				✓			
background and objectives	✓		✓	✓	✓			✓
design	✓			✓	✓		✓	
qualitiative desing appropriate	✓			✓				
idenified as RCT					✓			
method for randomisation	✓	✓			✓			
randomisation restrictions					✓			
sample size determiners					✓			
interim analysis and stopping guidelines					✓			
dates for trial recruitment and cessation								
ethicical considerations	✓			✓	✓			
elegibility criteria specified	✓			✓	✓	✓		
clinical history	✓	✓	✓		✓		✓	
subjects randomly allocated to groups	✓		✓		✓	✓		
groups commensurate	✓		✓			✓		
allocation concealed	✓	✓	✓		✓	✓		
participant blinding	✓	✓	✓		✓	✓		
blinding of therapist		✓	✓		✓	✓		
blinding of assessors	✓	✓	✓		✓	✓		
inter rater reliability	✓						✓	
independence of assessors	✓	✓					✓	
settings where data collected	✓			✓	✓			
similarity of interventions	✓		✓		✓			
target behaviours/intervention specifie	✓	✓	✓	✓	✓		✓	✓
treatment provided	✓		✓			✓		✓
intervention adaptations	✓			✓				✓
fidelity assessed	✓							✓
sampling during treatment	✓						✓	
primary and secondary outcomes specif	✓	✓	✓	✓	✓			
baseline	✓						✓	
change identified	✓				✓			
raw data and variabililty reported	✓			✓	✓	✓		
statistics	✓				✓			
participant analyses	✓				✓	✓		
effect sizes and confidence intervals					✓			
bias, imprecision, multiplicity of analyses				✓	✓			
interpretation balances					✓			
power calculations					✓			
85% participant data collected	✓					✓		
replication	✓						✓	
generalisation/transferability	✓			✓	✓		✓	
intention to treat analysis					✓	✓		
benefits outweigh harms and costs	✓		✓					
can results be applied in local context	✓		✓					
harms or unintended effects					✓			
greater value than other interventions			✓					

Note. atherapy = activation therapy; Cochrane = Cochrane Review Study Characteristics Categories (Brady et al., 2016);CASP RCT = Critical Appraisal Skills Programme Randomised Controlled Trials Checklist (CASP, 2020); CASP QUAL = Critical Appraisal Skills Programme Qualitative Checklist (CASP, 2018); CONSORT = Consolidated Standards of Reporting Trials (Moher et al., 2001); PEDro = Physiotherapy Evidence Database Scale (Maher et al., 2003); Single-Case Experimental Design Scale (Tate et al., 2008); TIDieR = Template for Intervention Description and Replication Checklist (Hoffmann et al., 2014).

The comparison between the indicators present in this trial and the benchmarks set by the six quality checklists suggests that the results of this study can only be considered preliminary and exploratory. This is because the study did not achieve the indicators relevant for a group randomised controlled trial which is considered the highest level of evidence ((Oxford Centre for Evidence-Based Medicine, 2011). The current activation therapy trial did not recruit enough participants for findings to be anything more than preliminary and exploratory. It was also conducted by a single person. This means that blinding measures that can be put in place to remove the impact of researcher bias were not completely achieved. Having more people to conduct the different parts of the therapy trial would reduce the risk of bias that is inherent in single person conducting a study. This factor also suggests that this research project is relatively preliminary and replication in future studies, such as the study outlined in, 7.11 Further Research Directions, would be beneficial.

7.4 Control Measures

The next part of this final chapter will examine topics that are relevant to the current research but were not specific to any specific results chapter. The first of these is the control measures used in the study which did not change significantly over the course of therapy (see Table 4.10 Control Assessment Results). Twelve therapy sessions of activation therapy using connected speech to stimulate brain function did not result in better understanding of sentences when this was tested using the Test of the Reception of Grammar 2 (Bishop, 2003). This is perhaps surprising given that six and twelve weeks of activation therapy that used speech in sentences to stimulate thinking about a word’s meaning with repeated auditory stimulation did not have a positive impact on sentence understanding. This result echoes the results of Bixley’s (1998) study in which twenty weeks of activation therapy did not result in improved sentence comprehension for the four participants with aphasia when their understanding was assessed using the original Test for the Reception of Grammar (Bishop, 1982). It seems that the results of both of these studies suggest that activation therapy does not impact on sentence processing and its benefit is specific to single word finding.

Furthermore specific verb finding and sentence processing therapy would be needed to work on impaired comprehension and production of sentences.

The results of this study also raised three discussion points about the link between language and cognition. First, the language processing skills of PWA are often disproportionately affected to the impact of brain damage on other cognitive domains and this was particularly evident for p1. He was the person with the most severe language impairment but he was also the person who completed the non-verbal test of visual analogic thinking with the greatest success. P1's scored of 53 and 52 out of a possible 60 in his original Standard Progressive Matrices (Raven, 2006) assessment whilst p4 who had a less severe form of aphasia scored only 21 in her original assessment. P1's results alone suggest that access to language is not an essential part of being successful in the Standard Progressive Matrices (Raven, 2006), and p6's successful repetition and relatively successful spoken word finding skills appear to suggest that language processing and Standard Progressive Matrices (Raven, 2006) appear to be using different types of underlying processing skills.

Secondly, The Standard Progressive Matrices (Raven, 2006) were used to compare the impact of activation therapy on word finding skills with its impact on visual analogic thinking. Whilst there was a significant difference between word finding skills measured at a1 and a3 there was no corresponding significant difference in The Standard Progressive Matrices (Raven, 2006) scores, even though the two tailed Wilcoxon Signed Ranks Test approached significance and five of the seven participant's scores increased from a1 to a3 assessment (see Table 4.10 Control Assessment Results). There is always the possibility that participants' ability to complete the assessment changed because they became familiar with the assessment and their performance improved because of practice (Orrell et al., 2007) but the degree of difference in the significant improvements in word finding skills argue for the specific impact of activation therapy on word finding rather than a generalised impact on cognition.

The third discussion point is that participants and their ttps suggested that cognitive skills had improved over the course of therapy when they discussed its impact in therapy experience interviews. Participants and ttps cited instances of clearer thinking, remembering the day that they were coming to therapy and how the ability to self-regulate had all changed over the course of therapy (6.4.7 Changes to Regaining Lost Self Theme Within the Timeframe of this Study). Here again, the reason for this difference is hard to define. Did improved attention, short term memory skills and improved self- regulation translate into improved language or did improved language have an impact on thinking, remembering and the ability to adjust responses to emotions. The difference between the impact of activation therapy on word finding and cognitive assessment argues for the latter explanation, that improved access to language allowed better use of cognitive function but it would be difficult to claim that twelve weeks of activation therapy did not impact on the attention and short term memory skills of these participants with aphasia, but they did not appear to do so in any significant way. These three discussion points will hopefully add to the current conversation about the relationship between language therapy and cognition therapy (Code, 2018; Harnish & Lundine, 2015; Hula & McNeil, 2008; McNeil et al., 2011; Spitzer et al. 2020).

7.5 Severity Ratings

The Goodglass and Kaplan (1983 p.28) severity ratings (see Table 3.1 Aphasia Severity Rating Scale) which were collected throughout the project within a1, a2 and a3 assessments periods did not show any change. This type of numeric scale is favoured by both Speech and Language Therapists and researchers. Familiar and accessible scales are an attractive prospect for busy therapists who are encouraged to measure and test the worth of their work (Enderby et al. 2006). They have also been used by those who research into the usefulness of communication therapy post stroke (Bowen et al., 2012; Palmer et al. 2019). However, the results of this study suggest that clinically relevant changes were not large enough to register as a change on the Goodglass and Kaplan (1983 p. 28) severity rating scale. This is because the hard won advances in word finding skills, length of noun phrases skills and impact on living with aphasia were too small to register as point changes on a generalised scale. The results of this study suggest that future studies need to measure behaviours in enough detail so that clinically relevant improvements can be captured and then the successful parts of therapy studies can be used to add to the evidence base that supports intervention for PWA.

7.6 Localisationist Diagnoses

Authors who specify the type of information that should be in included in therapy studies (see 7.3 Limitations) do not explicitly suggest that the differential diagnosis of aphasia is required within good quality aphasia research. Neither do Brady et al. (2012) in their Cochrane Library Review when they list the selection criteria for inclusion in their meta-analysis. This exclusion is significant because the differential diagnosis of the type of aphasia has been a major topic within the field of aphasia research since its inception.

The omission may be attributable to a lack of consensus about the labels to use to describe the different types of aphasia. Significant authors who write about aphasia, such as Luria (1970) and Schuell et al. (1964) developed their own classification systems that have not been adopted by the aphasia community. Others, such as and Kertesz (1982) and Goodglass and Kaplan (1983) use the logic of language processing outlined by Lichtheim (1885) and superimpose labels derived from the localisationist approach to differentially diagnose aphasia. In these taxonomies, therapists are asked to differentially diagnose aphasia by comparing their comprehension and expression language abilities. These definitions have been generally accepted and are used within the Speech and Language Therapy research community, Global, Broca's, Wernicke's, Conduction, Anomic (Goodglass & Kaplan, 1982; Kertesz, 2006). The only classification that has not achieved universal agreement is that of conduction aphasia. For this classification authors such as Hodges (1998) and Franklin et al. (2002) appear to think PWA have less ability to find words than Lichtheim's (1885) original description of conduction aphasia. These localisationist terms have been used to describe participants in recent research projects (Van Hees et al. 2013; Wambaugh et al. 2014) and appear to be so widely understood and that researchers such as Best et al. (2013), Tsuda et al. (2013) and Massaro et al. (1994) differentially diagnose participants without recourse to formal assessment batteries.

It would have been hard to provide a localisationist diagnosis for the seven participants within this therapy trial without conducting the formal assessments whose purpose is to assess language function definitively (Goodglass & Kaplan, 1982; Kertesz, 2006). One of the underpinning principles of the language assessment process used in this study was the acknowledgement that assessment may be a form of therapy and practice makes perfect (Nickels, 2002). To add another lengthy assessment to this process did not fit with this premise.

It would also have been very difficult to assign a localisationist diagnosis without performing a formal assessment such as The Assessment of Aphasia and Related Disorders (Goodglass & Kaplan, 1982) or The Western Aphasia Battery (Kertesz, 2006). This is because participants' language abilities did not fit neatly into these localisationist classification subgroups. For example, see p3's 4.2.2 Initial Single Word Processing Results, and her talk in 6.4.14 Re-engaging with Other Others - Theme, which suggests that her awkward struggling output is reminiscent of a person Broca's aphasia but this description does not fit neatly with her inability to understand two element sentences (see Table 4.10 Control Assessment Results). Also, p2's fluent empty talk in 6.4.14 Re-engaging with Other Others, is reminiscent of a person with fluent Wernicke's aphasia but his single word understanding (see 4.2.2 Initial Single Word Processing Results) and his ability to understand four element sentences do not (see Table 4.10 Control Assessment Results). These two participants do not fit neatly into a localisationist diagnostic category and highlight the relevance of identifying a specific cognitive neuropsychological differential diagnosis which allows an individual description of a participant's single word processing difficulties (see 2.4.9 Model Appropriate Therapy and 4.2.2 Initial Single Word Processing Results) and thereby provide a theory for the success of word finding therapy (Webster et al., 2015).

7.7 Aphasia Therapy is a Scarce Resource

Participants with aphasia and their ttps talked about aphasia therapy as if it were a scarce resource that they had been lucky enough to access. When they talked about their inclusion in this therapy trial they used words and phrases like miracle, jackpot and the best thing since sliced bread. Their discharge from state funded Speech and Language Therapy was described in emotive words and phrases. p7 said he was heartbroken when he was discharged from therapy. p6 described how he was pushed out of therapy, p4 was told that it was tough that she couldn't continue with therapy any longer and ttp6 was told to take a holiday and accept what had happened. At the same time as expressing disappointment about the cessation of therapy participants showed an awareness that therapy was a finite resource and recognised that Speech and Language Therapy had a problem with accommodating the need for long term aphasia therapy intervention.

p5 attributed her discharge from therapy as a result of to her inability to ask for more therapy and indeed, interview analysis suggested that PWA had difficulty sharing what happened in the therapy room. ttps did not routinely attend therapy sessions and language therapy was described as a private thing that PWA and their therapists shared moreover, this was a part of their life that ttps did not take part in. This lack of ttp direct oversight combined with a difficulty with self-advocacy might mean PWA who wish to continue with Speech and Language Therapy might have their wishes overlooked. It may also lead to PWA being disadvantaged because of their language disability. The interviews conducted in this research project suggest that when therapy planning took place the wishes of PWA were not prioritised and were even overlooked.

Perhaps because therapy had been withdrawn, ttps and participants with aphasia expressed displeasure in the way therapy had been provided. p2, without language, clearly described a service provider who appeared to have very little regard for his need for rehabilitation. ttp1 expressed extreme frustration that his son had not received what he would have considered Speech and Language Therapy. He recognised that his son had received communication therapy but complained that his son had needed help with, speaking. He was not alone. p5 disparagingly referred to a Speech and Language Therapy that was only interested in computers pictures and words and ttp3 described therapy which did not address the need to improve speech.

The views of those living with aphasia should be particularly relevant at a time when our health services require collaborative (Evans, 2012; Turner Stokes, 2009; Worrall et al., 2011), authentic (Day

& Tosey, 2011; Evans, 2012;) and theoretically motivated goal setting that provides an impetus for change in health care delivery (Siegert and Taylor, 2004; Sorin Peters, 2003). Negative opinions about Speech and Language Therapy may have been attributable to rationing and prioritisation and the literature describes how Speech and Language Therapy Services have a lack of focus on providing aphasia therapy rehabilitation (Bixley et al., 2011; Code & Petheram, 2011; Code & Heron, 2003; Northcutt et al, 2017). Speech and Language Therapists may use this resourcing shortfall as a reason to discharge PWA from their services but this study demonstrates, as well as the literature suggests, that this discharge from a previously supportive service (Hersch, 1989) is very hard for PWA and their ttps. Discharge from Speech and Language Therapy leaves them without a very important part of their long-term support system (Le Dorze & Signori, 2010; Natterlund, 2010) and without one of their key communicative partners (Kagan et al., 2001) they are "left in a wilderness without communication" ttp7 a1.

7.8 Therapy is Tiring

This study highlighted that accessing therapy is tiring. The stroke literature also recognises the impact of pain and fatigue in people with stroke (Appelros, 2006; Chaudhuri & Behan, 2004). It may be that active impairment-based therapy is too tiring for some PWA. The average age of the participants with aphasia in this trial was 52. The two people who were unable to complete the trial were in their eighties and found attendance and completing impairment based assessment and therapy onerous. One died before this report from repeated strokes and the other was diagnosed with vascular dementia, and also died before this PhD was submitted. Being fit enough for therapy has not been addressed before in the literature, but having enough stamina may be a factor that should dictate the uptake, implementation and success of impairment based therapy activity.

7.9 Vocabulary Choice

This activation therapy trial suggests that activation therapy helps people with aphasia to find words and its impact generalises to words not used in therapy. Success of therapy was limited to a restricted set of words that may have limited relevance beyond their unassailable relevance to a therapy trial that needed to control factors that could have impacted on, why one word may have been more successful in word finding assessments than another (Funnell & Sheridan, 1992). In real life Speech and Language Therapy, this impetus for creating matched sets of stimuli is not such an important factor and in line with previous research (Greenwood et al. 2010; Renvall et al., 2013; Palmer et al., 2019) the results of this study suggest therapists should use vocabulary that is personally relevant to the people they are working with. This is because PWA find it difficult to reacquire vocabulary it seems that the most effort should concentrate on using vocabulary that will have the biggest impact on everyday life. Thomas (1999) created a methodology that could be used to elicit relevant vocabulary that could be used to elicit personally relevant words. She asked the thirty six participants in her research to list the ten most relevant words from twelve everyday categories, things found in a kitchen, forms of transport, animals, clothing and accessories, thing outdoors, drinks, things found in the living room, parts of the human body, things found in the bathroom, main meal food, breakfast food and miscellaneous common objects. If ttps were asked to compile this list of words for their partners with aphasia this technique could ensure that relevant vocabulary would become the mainstay of every aphasia therapy session.

7.10 Role of the Researcher in Quantitative Analysis

A study which only has seven participants means that the results of the study have limited value when compared to the results obtained from large scale studies such as those conducted by Bowen et al. (2012), Palmer et al. (2019) and Fleming et al. (2021). It is harder to generalise this activation therapy trial's findings because of its small size. In an attempt to overcome this anticipated difficulty, the therapy trial enrolled people with all types of aphasia to see if activation therapy could be relevant to people with different degrees and types of word finding difficulty. The statistical results that are so hard to achieve in such a small therapy trial (Byng and Jones, 2005; Howard, 1986) provide evidence to support the use of activation therapy with and without word finding to help people with aphasia find words for themselves again. It would be hard to argue against the benefits of conducting a larger scale study looking into the impact of activation therapy, but this study was outside the remit of this PhD.

Small scale studies have the advantage of being able to perform the detailed analyses that can be used to underpin the rationale for individual responses to therapy. The small scale of this therapy trial allowed the detailed assessment of each participant's underlying language processing problems and allowed a detailed description of why activation therapy may have worked for the seven participants in this trial. This is very hard to achieve in a large scale clinical trial whose findings are limited to the number of people that did or did not benefit, rather than the detail of why therapy may have worked, elements which Enderby and Emerson (1995, p.166) and Webster et al., (2015) suggested were essential in aphasia research.

At various time in phase 1 and phase 2 it became very difficult not to provide alternative therapies or assess some aspect of language processing informally. These are things that would happen throughout a typical aphasia therapy session. Informal assessment allows the therapist to refine the diagnosis of the language processing difficulty. Using different therapy techniques would allow the therapist to target a variety of specific language functions at the same time and by doing this encourage improvements in the whole language system. As improvements in language function occurred more complex forms of different types of therapy techniques would be introduced. In a trial such as this, these adaptations could not be introduced because of the imperative to provide a specified type of therapy in a specified way. However, the impulse to use a problem based eclectic form of aphasia therapy, had to be checked repeatedly throughout the two phases of the therapy trial.

One of the consistent opinions that was expressed in the study was that, participants and ttps resented that there was no option to continue with impairment based aphasia therapy. A recent study into the treatment outcomes that were relevant to aphasia clinicians and managers conducted by Wallace et al. (2017) did not seem to highlight satisfaction with current communication as a desirable outcome for Speech and Language Therapy intervention. In this current therapy trial, dissatisfaction with communication was expressed by all participants. It is difficult to provide impairment based therapy long term (Bixley et al., 2011; Code & Petheram, 2011; Code & Heron, 2003) but it seems that the current practice of discharging PWA into the community, irrespective of whether or not they access voluntary support groups, leaves those that live with aphasia feeling unsupported. One of the most difficult parts of this study was to finish the study and withdraw the support that I had provided during the study to both participants and their ttps.

One of the participants, p2 was insistent that he should be considered for the second phase of the therapy trial because he did not want to leave the benefits he had received whilst a participant. In the end, both he and p1 were offered another therapy trial because it had been difficult to recruit new participants to the second phase of the trial and there was spare capacity. p3 was also offered another therapy trial with another student frontrunner researcher who delivered a second period of activation therapy to investigate whether the impact of the therapy technique was transferrable. The discharge dilemma is not new (Hersh, 1989) but so far not discussed in the aphasia research literature. In future projects it would be beneficial to think about how to plan for ongoing participant support when language therapy is withdrawn. The opinions of the participants and ttps in this trial could also be considered an ongoing impetus for exploring a service delivery model that can deliver intervention at a very low cost for as long as PWA feel it might benefit them but who cannot afford to pay for independent aphasia therapy.

7.11 Further Research Directions

This research has demonstrated the positive impacts of activation therapy with a limited amount of input (Baker, 2012) and it would be relevant to take this research one stage further. This next stage would be to investigate the impact of activation therapy on more participants so that the generalisability of its findings could be extended. Any future research project would have to consider the impact of therapy on each individual (Sedgwick, 2014), whilst achieving sufficient participant recruitment to achieve statistical rigour (Cohen, 1992). It would also be desirable to retain the flexibility of using ranks rather than means as a way of measuring impact in a group of people with different types and different severities of aphasia (Bridge & Sawilowsky, 1999). Its implementation would also have to be delivered by a team of researchers adequate blinding could be achieved (see 7.3 Limitations).

A randomised controlled trial would be the logical extension of this research project. As has been argued previously in this thesis (see 6.5 Different Possible Interpretations for the Positive Impact of Attending the Activation Therapy Trial) there are multiple reasons that might contribute to the impact of any healthcare package. The implications for a randomised controlled trial would be to find a way of separating the impact of activation therapy from the impact of attending a course of therapy. One way could be to offer an alternative therapy and compare its impact to activation therapy. Conceptually this therapy input should not be related to communication in anyway. For example, conversation is a form of therapy (Beckley, et al., 2013; Beeke et al., 2014) and therefore could not be considered a language free alternative (Brady et al., 2016; Palmer et al., 2019). Neither could attention training therapy which also relies on communication to deliver the intervention (Murray et al., 2006). Furthermore, the alternative therapy provision needs to be considered as desirable as activation therapy so that all of the positive benefits of attending a healthcare intervention are equalised across the two groups (see 6.5 Different Possible Interpretations for the Positive Impact of Attending the Activation Therapy Trial). For example, spending a therapy session completing a jigsaw, in silence, with a trained volunteer may not engender as much positivity from participants as a therapy delivered by a qualified expert.

One possibility may be to deliver an alternative therapy that does not need language for its delivery. For example, some branches of physiotherapy could be delivered without language (Brock et al., 2011; Paci, 2003) and comparing the impact of activation therapy with physiotherapy in a series of individuals with post stroke aphasia and hemiplegia may help to separate more fully the impact of attending a healthcare intervention and the intervention itself. A project of this type would also contribute to the interdisciplinary research agenda (Research England, 2021; Okamura, 2019).

It may also be relevant to conduct another small scale investigation to try to unpick the active ingredient of activation therapy in more detail. For example, was activation therapy successful because it improved access to words representations or because it enhanced the network of associations for words. This trial could compare the impact of listening to words and saying words with the impact of listening to associations and saying words. This type of study could speak to the debate about whether word representation is decompositional or not and interactive (Dell & O'Seaghdha, 1991; Howard et al., 2006; Lambon Ralph, 2000; Levelt, 2001; Levelt et al., 1991; Schwartz et al. 2006).

This current therapy trial used Braun and Clarke's (2006) thematic analysis to find out how activation therapy had affected the lives of its seven participants and their therapy trial partners. This type of analysis is different to quantitative analysis of data which is evaluated in measurable units. Although rigorous and principled, it answers a different type of question that would be difficult to answer using quantitative methods. It adds a different experiential and meaning making type of evidence to any investigation evaluating the impact of activation therapy. Whether or not the model created in this study explains how it feels to live with aphasia can only be answered by the participants in this therapy trial (Charmaz, 1997, p. 183) and this too is outside the remit of this PhD. However, this type of feedback about the way in which the single investigator constructed an understanding of the impact of activation therapy affected would be very valuable and would also be an aim on ongoing research. A project that investigates participants' and ttps' feelings about the model and how it represents their thoughts about living with aphasia would be one future direction to pursue.

Another direction would be to develop the recordings that were made during the therapy trial into therapy and teaching resources. If activation therapy was successful without the presence of a therapist, it could provide a low cost alternative for ongoing therapy for PWA. Initially current recordings using Snodgrass and Vanderwart (1980) vocabulary could be used to evaluate its transferability but in the long term, providing a framework for others to inset their own vocabulary may offer a future avenue for this kind of research. As consent is an ongoing process, another research project would be to co-construct teaching resources with the original participants in this trial using the original therapy recordings. In this way they would be offered the opportunity to revisit their original consent forms and be able to define their agreement to the ongoing use of their images.

Finally, this research project has highlighted an unmet need for ongoing low cost aphasia therapy. The final but probably most important research project suggested by this activation therapy trial is to find some way of meeting this need which is currently not being met by the National Health Service or charitable support organisations. There are several ways in which PWA are already supported in the community, coffee morning meetings, conversation group meetings, conversation partner schemes. There are also several methods used in teaching which allow people to learn from each other, problem based learning, peer tutoring, group work, reflective learning. There are also people in the close circle of those with aphasia and other unconnected people who offer their time voluntarily to support the needs of others. It is hoped that future work that stems from this research will result in a low cost model for long term aphasia therapy which harnesses the determination of those with aphasia who want more therapy, their significant others and the support from people in the wider community who want to do something useful with their time. If this model is successful it could be replicated and offer long term affordable aphasia therapy for those with aphasia and those that live with them.

7.12 Further Analysis of the Data Corpus

Post therapy follow up assessment was not possible because of the time constraints and scope of the original study but it will form the basis of ongoing research into the impact of activation therapy. Three months after a3 assessments had been conducted participants took part in a4 assessments that included three more Snodgrass and Vanderwart (1980) 260 picture naming assessments and participant and ttp interviews. Word finding assessments will be analysed to investigate the longer term impact of activation therapy on word finding and interviews will be analysed using deductive theoretical thematic analysis (Braun & Clarke, 2006). The themes identified in this original research will be used to analyse these final interviews for talk that provides details about the ongoing impact of activation therapy on, regaining lost self, alleviating reliance on close others, re engagement with other others and talking is better. a4 Interviews will also be analysed deductively for noun phrase length to see if this indicator is easy to gather and can be used to demonstrate improvements in expressive language.

Three participants, p1, p2 and p3 also received a further package of the two therapy technique counterbalanced crossover activation therapy trial. These further packages of care will be analysed evaluate the impact of a further 12 weeks of activation therapy. Finally, p3 received her therapy from a Speech and Language Therapy Student Frontrunner under the supervision of the lead researcher. The analysis of p'3s second therapy trial will offer insight into the transferability of activation therapy beyond the impact of this therapy trial.

7.13 Original Contributions to knowledge

Activation therapy is a new therapy technique that has not yet been described in peer reviewed literature. The results of this study provide support for a new way to address the word finding difficulties of PWA and they also suggest that activation therapy without word finding practice is as effective as activation therapy with word finding. This question has not been asked or answered before in the aphasia literature which to date has identified that that therapy without word finding is successful but has not compared the impact of therapy with and without word finding.

This project used detailed grammatical analysis to analyse the impact of activation therapy on its seven participants. The use of grammatical analysis to measure the impact of an impairment based therapy has not been used frequently in the literature before now, despite its relevance and accessibility to practising clinicians. The use of vertical grammatical analysis on an excel spreadsheet optimised the way in which data could be examined and is was an unexpected innovation in this therapy trial. It is difficult to find a clinically relevant way of assessing the impact of word finding therapy on every day communication and grammatical analysis results suggested one indicator that is easy to identify and quantify. It is an indicator that could be used to chart the impact of therapy in real time everyday interviews. This is the first time that the length of noun phrase length has been suggested as a possible indicator for change and its identification was only possible because of the fine grained linguistic analysis of participant interviews.

Thematic analysis has also never been used to understand the wider psychosocial benefits of an impairment based therapy on those living with aphasia and the verification Interview process created for this research study enabled people with severe aphasia to give their opinions about the therapy they received. Thematic analysis used the everyday therapy interview in which clinicians ask PWA and their significant others for their views about therapy. Its findings suggested that activation therapy had a wide ranging impact on those living with aphasia and their ttps..

Finally, this is the first group therapy trial that has combined these three ways of evaluating the impact of intervention. These three complementary methods provide qualitative and quantitative perspectives of the impact of an impairment based therapy and this is a highly desirable outcome. Triangulation and integration of the findings of the three methods suggested that activation therapy may have been successful because it positively affected the accessibility of nouns and noun syntax, this too is an original finding. It is hoped that the results of this small scale exploratory therapy trial will be used to support the evidence base for the use of impairment based therapy with people with aphasia and that elements of activation therapy and mixed methods used in this study can be transferred to clinical practice to help multifaceted measurement of the impact of impairment based therapy.

7.14 Clinical Implications

This small scale therapy trial provides support for a new type of therapy that has theoretical underpinnings, has achieved statistical significance, has impacted on word finding, sentence structure and the experience of living with aphasia. Activation therapy is a technique that is readily transferrable to clinical practice and can be adapted to suit individual clients by focussing on vocabulary that is relevant to them. It is relevant to people with all types of aphasia and all severities. Real time transcription of noun phrase production is clinically possible and can be carried out during routine clinical interaction. It may prove to be a way to capture the impact of aphasia therapy for people with different types and severities of aphasia. Lastly, this study may also provide a framework that therapists can use to record the impact of their therapy on those living with aphasia. In real time interviews therapists could record instances when PWA or their significant others talk about positive changes in self, relationships with others and the wider community, and language use. Although not psychometrically valid, personal testimonies of the impact of therapy on the person receiving therapy could be viewed as the most relevant type of impact of impairment based intervention. This study can be used as a rationale for and a mechanism for recording and recognising the importance of this type of personally relevant information about the impact of aphasia therapy.

7.15 Conclusions

This therapy trial was designed to investigate the impact of activation therapy on the word finding skills of people with aphasia by evaluating its impact on word finding, sentence grammar and the experience of living with aphasia. These aims and their associated objectives were achieved and what follows will summarise the key findings of this therapy trial. Activation therapy helped the seven participants in this trial to find more words and the success of activation therapy was not dependent on practising word finding out loud. Improved word finding skills seemed to be associated with an ability to create longer noun phrases. It also seemed to have a positive impact on the experience of living with aphasia and this was evident in improved relationships with self, close others, other others and perceived positive changes in the ability to communicate with others. When integrated the findings from all three methods seemed to support the contention that activation therapy had positively affected the ability to access nouns and noun syntax.

This triangulation and integration of evidence supporting the implementation of activation therapy was only possible using a mixed methods research design in which each method’s contribution was considered equally important for measuring the multifaceted impact of activation therapy with and without word finding. It is hoped that the therapy technique and this research project will add to the evidence base that supports intervention for people with aphasia. People like the participants in this therapy trial who were not happy to live without language and wanted the opportunity to practise using language in a therapeutic context and to benefit from the impact of activation therapy with or without word finding.

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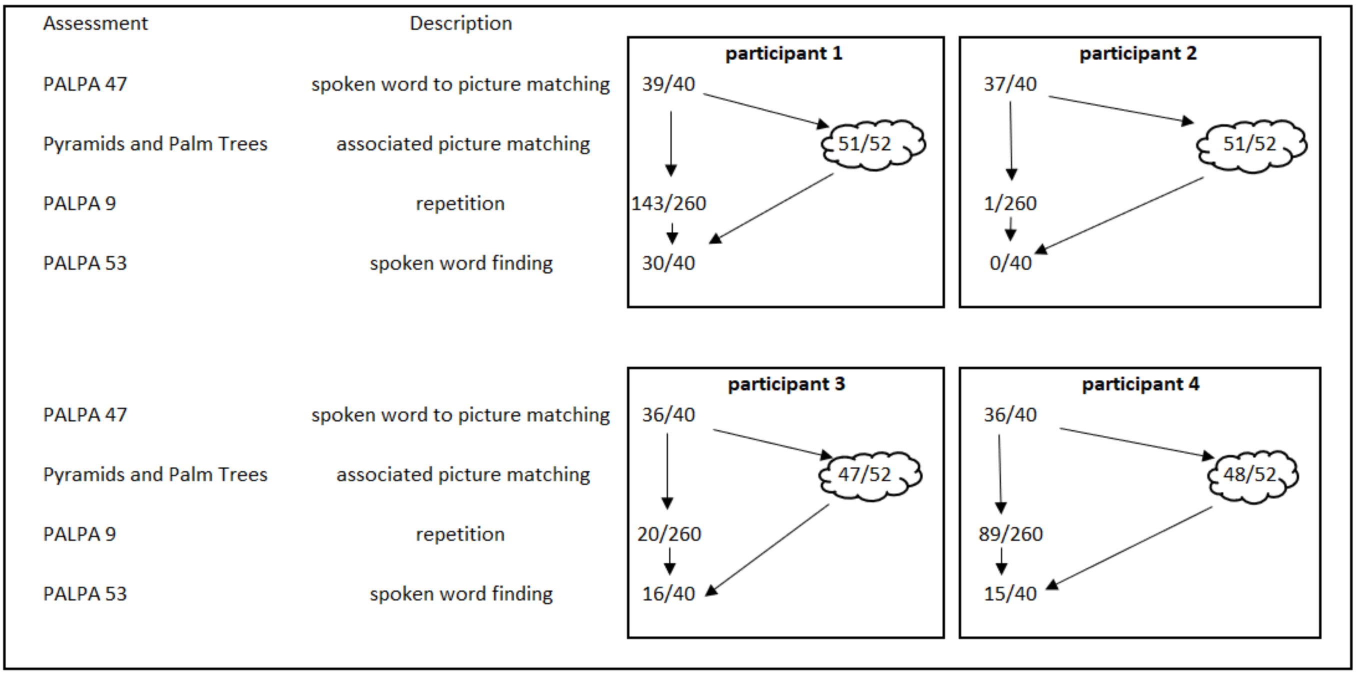
Appendices

Appendix 1

Summary of the Initial Single Word Processing Results conducted with the Four Participants in Bixley's (1998) Therapy Trial



Note. PALPA = Psycholinguistic Assessments in Language Processing in Aphasia (Kay et al., 1992). Pyramids and Palm Trees (Howard & Patterson, 1992).

Appendix 2

Raw data and Wilcoxon Signed Ranks Test Results for a1, a2 and Follow Up Assessment Results for the Four Participants in Bixley's (1998) Activation Therapy Trial

variable	pre therapy word finding a1			post therapy word finding a2			follow up word finding a3			z statistic	1 tailed
participant 1											
therapy words	0	0	0	17	29	31	17	23	28	-2.20	0.01
control words	0	0	0	13	10	12	12	15	24		
participant 2											
therapy words	0	0	0	1	0	0	0	1	1	-1.34	0.09
control words	0	0	0	0	0	0	0	1	0		
participant 3											
therapy words	0	0	0	13	13	7	7	8	11	-1.10	0.02
control words	0	0	0	4	5	3	4	10	7		
participant 4											
therapy words	0	0	0	10	15	13	15	17	17	-2.02	0.02
control words	0	0	0	10	12	10	14	9	10		

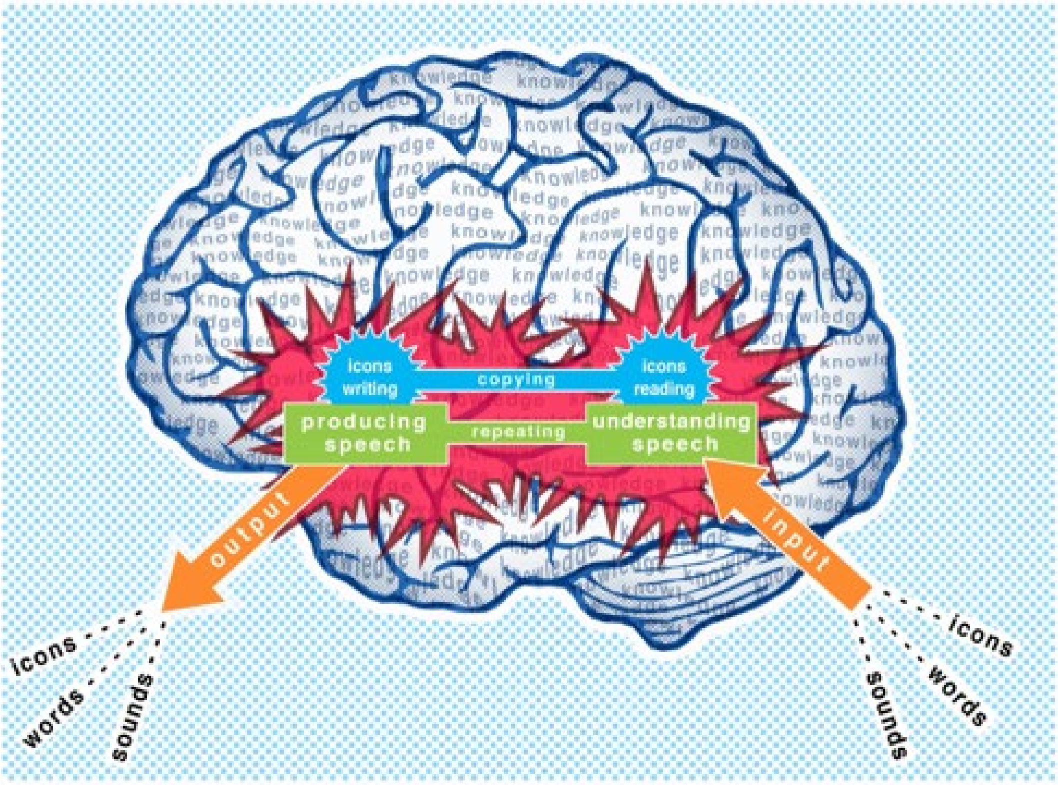
Note. Number of therapy words = 30. Statistical Test = Wilcoxon Signed Ranks Test z statistic comparing therapy words and control word finding.

Appendix 3

Therapy Record Sheet

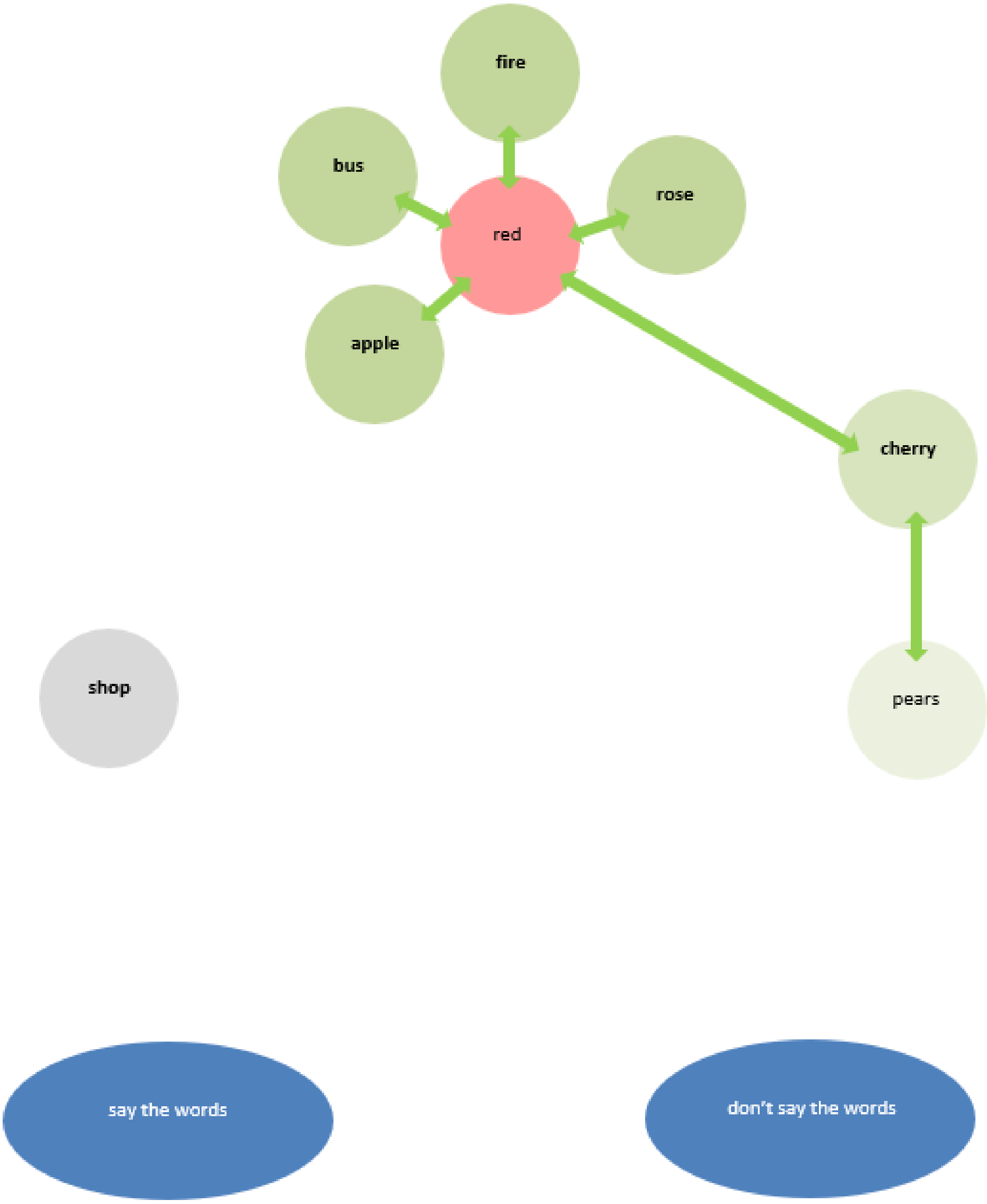
activation therapy trial session: name: date:

atherapy is …



Therapy record sheet page 1

activation therapy trial session: name: date:



Therapy record sheet page 2

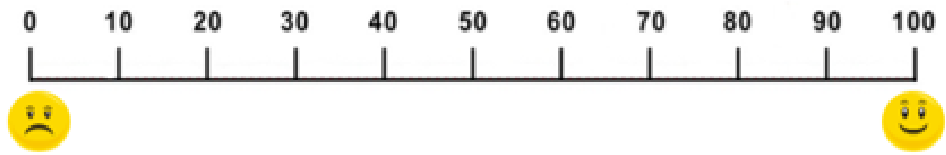
activation therapy trial session: name: date:

	Word	Identification	Spontaneous	Response to cues:									
				Sentence completion	Sound cue			Extended sound cue			Repetition		
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
21.													
22.													
23.													
24.													
25.													
26.													
27.													
28.													
29.													
30.													

name	synonyms and antonyms
what does it look like	subtypes
function	parts of
most obvious feature	often seen with
location	collocations
category membership	idioms
co-ordinates	sentence completions
most closely related to	idiosyncratic associations

Therapy record sheet page 3

What did you think of today's session:



Hard Easy

Not enjoyable Enjoyable

Bad Good

Appendix 4

Participant Information Sheet

A mixed methods investigation into the usefulness of semantic activation therapy with and without word finding for people with aphasia

The Study:

- I want to find out if therapy can help PWA.
- I also want to compare the success of two types of word finding therapy.
- I will publish the results of this project.
- I will keep your information private and confidential.

You are a volunteer:

- You do not have to volunteer for this study.
- After assessment, your word finding skills might be too good for this study.
- If they are Morag will give you word finding therapy exercises that you can take away and do on your own.
- You can change your mind at any time.
- If you decide not to continue with the project, that is alright.
- You can also ask Morag not to use the work you have already done.

The University:

- This study has been checked by the De Montfort University, Faculty of Health and Life Sciences Research Ethics Committee.
- If you are worried about the study or have a complaint talk to Morag Bixley, the Lead Researcher (0116 2577814 mdbixley@dmu.ac.uk).
  or talk to someone else at the university (0116 2551551 hlsfro@dmu.ac.uk).

What the study will involve:

- If you agree to help me with this research, you will come to DMU twenty one times in ten months:

Oct	Nov	Dec		Jan	Feb	March
12 sessions				9 sessions		

October to December

1. Before therapy starts I need to assess you:

Assessment phase 1	3 x 1½ - 2 hour sessions October 2015

2. Then I will give you some word finding therapy:

Therapy 1	6 X 1 hour therapy sessions October to November 2015

3. Then I will need to assess you again:

Assessment phase 2	3 X 1 hour sessions December 2015

January to March

4. Then I will give you a different type of word finding therapy:

Therapy 2	6 X 1 hour therapy sessions January to February 2016

5. Then I will need to assess you again:

Assessment phase 3	3 X 1 hour sessions February to March 2016

Assessment and therapy phases

Assessment

In assessment phase 1, I will ask you to do nine assessments:

- 3 word finding assessments.
- 1 repeating words assessment.
- 2 understanding assessments.
- 1 reading assessment.
- 1 writing assessment.
- 1 non-verbal assessment.
- I will also interview you and your advocate. I will ask you about your life with aphasia.

In assessment phase 2, I will not assess you as much. I will ask you to do:

- 3 word finding assessments.
- 1 understanding assessment.
- 1 non-verbal assessment.
- I will also interview you and your advocate. I will ask you about your life with aphasia.

In assessment phase 3 and 4 we will use the same assessments that we used in assessment phase 2. I will also interview you about your life with aphasia.

Therapy

Therapy phases

- I will give you word finding therapy in both therapy phases.
- In therapy you will have to listen to thirty word descriptions.
- These descriptions will activate the areas of your brain that know about words.
- I will ask you to respond to each description.
- In one therapy, I will ask you to say the word aloud. I will help you to say the word if you need help.
- In the other therapy, I will not ask you to say the word. I will ask you to point to a word.
- In both therapy phases I will ask you to rate how hard therapy was.

Recording assessment and therapy sessions

For the research project:

- Morag will need to make a DVD of the assessment and therapy sessions.
- You will be seen and heard on these DVD recordings.
- Because Morag needs to check her research.
- Morag's supervisors and research team will need to double check her research.

Recording assessment and therapy sessions

After the research project:

- Morag would like to create assessment, therapy and teaching resources based on her research.
- Morag will ask you if you give her permission to use these images for: conferences, teaching and developing assessment and therapy resources.
- You do not have to agree to this.

If you would like to take part in this research, thankyou, that is great.

- Please take this form home and discuss it with your significant other. This person will be your advocate in this research project.

- Please look at the consent form on the last page of this information sheet. You will sign the consent form if you want to take part in this study.

- If you are both happy, phone Morag Bixley on 0116 2577814 or email her on mdbixley@dmu.ac.uk.

- She will arrange to meet with you both so that you can ask questions. Morag will also talk through the consent form with you before you sign it.

Appendix 5

Participant Consent Form

A mixed methods investigation into the usefulness of semantic activation therapy with and without word finding for people with aphasia

You and your advocate should sign each statement with your initials:

The Study:

☐ ☐ I understand the information I have listened to and read.

☐ ☐ I am a volunteer. I know I can stop at any time.

☐ ☐ I agree to my sessions being recorded on a DVD.

☐ ☐ I know that Morag will talk to her supervisors and research team about her work.

☐ ☐ I agree to take part in this study.

After the study:

☐ ☐ I give Morag Bixley permission to use the DVD recordings. I know she may give presentations and make teaching assessment and therapy materials.

☐ ☐ I would like to be a co-author.

☐ ☐ I know that this means Morag may use these DVDs after my Death.

☐ ☐ I agree that Morag can use my recordings.

Name:	____________	Signature:	____________	Date:
Advocate name:	____________	Advocate signature:	____________	Date:
Researcher name:	____________	Researcher signature:	____________	Date:

Appendix 6

Word List for the Snodgrass and Vanderwart (1980) 260 picture set

1	Accordion	51	Celery	101	Frying pan	151	Nail	201	Seal	251	Watering can
2	Airplane	52	Chain	102	Garbage can	152	Nail file	202	Sheep	252	Watermelon
3	Alligator	53	Chair	103	Giraffe	153	Necklace	203	Shirt	253	Well
4	Anchor	54	Cherry	104	Glass	154	Needle	204	Shoe	254	Wheel
5	Ant	55	Chicken	105	Glasses	155	Nose	205	Skirt	255	Whistle
6	Apple	56	Chisel	106	Glove	156	Nut	206	Skunk	256	Windmill
7	Arm	57	Church	107	Goat	157	Onion	207	Sled	257	Window
8	Arrow	58	Cigar	108	Gorilla	158	Orange	208	Snail	258	Wineglass
9	Artichoke	59	Cigarette	109	Grapes	159	Ostrich	209	Snake	259	Wrench
10	Ashtray	60	Clock	110	Grasshopper	160	Owl	210	Snowman	260	Zebra
11	Asparagus	61	Clothespin	111	Guitar	161	Paintbrush	211	Sock		
12	Axe	62	Cloud	112	Gun	162	Pants	212	Spider		
13	Baby carriage	63	Clown	113	Hair	163	Peach	213	Spinning wheel		
14	Ball	64	Coat	114	Hammer	164	Peacock	214	Spool of thread		
15	Balloon	65	Comb	115	Hand	165	Peanut	215	Spoon		
16	Banana	66	Corn	116	Hanger	166	Pear	216	Squirrel		
17	Barn	67	Couch	117	Harp	167	Pen	217	Star		
18	Barrel	68	Cow	118	Hat	168	Pencil	218	Stool		
19	Baseball bat	69	Crown	119	Heart	169	Penguin	219	Stove		
20	Basket	70	Cup	120	Helicopter	170	Pepper	220	Strawberry		
21	Bear	71	Deer	121	Horse	171	Piano	221	Suitcase		
22	Bed	72	Desk	122	House	172	Pig	222	Sun		
23	Bee	73	Dog	123	Iron	173	Pineapple	223	Swan		
24	Beetle	74	Doll	124	Ironing board	174	Pipe	224	Sweater		
25	Bell	75	Donkey	125	Jacket	175	Pitcher	225	Swing		
26	Belt	76	Door	126	Kangaroo	176	Pliers	226	Table		
27	Bicycle	77	Doorknob	127	Kettle	177	Plug	227	Telephone		
28	Bird	78	Dress	128	Key	178	Pocket book	228	Television		
29	Blouse	79	Dresser	129	Kite	179	Pot	229	Tennis racket		
30	Book	80	Drum	130	Knife	180	Potato	230	Thimble		
31	Boot	81	Duck	131	Ladder	181	Pumpkin	231	Thumb		
32	Bottle	82	Eagle	132	Lamp	182	Rabbit	232	Tie		
33	Bow	83	Ear	133	Leaf	183	Racoon	233	Tiger		
34	Bowl	84	Elephant	134	Leg	184	Record player	234	Toaster		
35	Box	85	Envelope	135	Lemon	185	Refrigerator	235	Toe		
36	Bread	86	Eye	136	Leopard	186	Rhinoceros	236	Tomato		
37	Broom	87	Fence	137	Lettuce	187	Ring	237	Toothbrush		
38	Brush	88	Finger	138	Lightbulb	188	Rocking chair	238	Top		
39	Bus	89	Fish	139	Light switch	189	Roller skate	239	Traffic light		
40	Butterfly	90	Flag	140	Lion	190	Rolling pin	240	Train		
41	Button	91	Flower	141	Lips	191	Rooster	241	Tree		
42	Cake	92	Flute	142	Lobster	192	Ruler	242	Truck		
43	Camel	93	Fly	143	Lock	193	Sailboat	243	Trumpet		
44	Candle	94	Foot	144	Mitten	194	Saltshaker	244	Turtle		
45	Cannon	95	Football	145	Monkey	195	Sandwich	245	Umbrella		
46	Cap	96	Football helmet	146	Moon	196	Saw	246	Vase		
47	Car	97	Fork	147	Motorcycle	197	Scissors	247	Vest		
48	Carrot	98	Fox	148	Mountain	198	Screw	248	Violin		
49	Cat	99	French horn	149	Mouse	199	Screwdriver	249	Wagon		
50	Caterpillar	100	Frog	150	Mushroom	200	Seahorse	250	Watch		

Appendix 7

Word Lists for the Snodgrass and Vanderwart (1980) Three Word Finding Assessments and Snodgrass and Vanderwart (1980) 1 Spoken Word Finding Assessment Page 57 for toothbrush

S&V word finding 1

No	item	response	code
1	Shoe		
2	Book		
3	Car		
4	Sandwich		
5	Mitten		
6	Ant		
7	Seahorse		
8	Foot		
9	Arm		
10	Corn		
11	Barn		
12	Doorknob		
13	Brush		
14	Baseball bat		
15	French horn		
16	Glasses		
17	Door		
18	Kangaroo		
19	Hanger		
20	Piano		
21	Tomato		
22	Window		
23	Screwdriver		
24	House		
25	Saw		
26	Couch		
27	Bee		
28	Truck		
29	Ball		
30	Ironing board		
31	Plug		
32	Butterfly		
33	Swan		
34	Stove		
35	Eagle		
36	Duck		
37	Eye		
38	Watering can		
39	Fork		
40	Candle		
41	Spoon		
42	Snake		
43	Kettle		
44	Airplane		
45	Skunk		
46	Apple		
47	Sheep		
48	Harp		
49	Vase		
50	Desk		
Totals:			

No	item	response	code
51	Nose		
52	Doll		
53	Bed		
54	Zebra		
55	Finger		
56	Horse		
57	Toothbrush		
58	Trumpet		
59	Peach		
60	Lips		
61	Axe		
62	Stool		
63	Tennis racket		
64	Ruler		
65	Rocking chair		
66	Strawberry		
67	Frying pan		
68	Leaf		
69	Cloud		
70	Peanut		
71	Pants		
72	Glass		
73	Bread		
74	Clothes pin		
75	Television		
76	Chain		
77	Pineapple		
78	Dresser		
79	Train		
80	Clown		
81	Church		
82	Pumpkin		
83	Toe		
84	Boot		
85	Rooster		
86	Iron		
87	Spinning wheel		
88	Bottle		
89	Gorilla		
90	Fly		
91	Shirt		
92	Alligator		
93	Refrigerator		
94	Crown		
95	Hat		
96	Ashtray		
97	Tie		
98	Violin		
99	Spool of Thread		
100	Flag		
Totals:			

S&V word finding 1 page 1 Name: Date:

S&V word finding 1

No	item	response	code
101	Wheel		
102	Pipe		
103	Fox		
104	Mountain		
105	Cat		
106	Sweater		
107	Tree		
108	Deer		
109	Grapes		
110	Key		
111	Accordion		
112	Top		
113	Suitcase		
114	Thumb		
115	Frog		
116	Fence		
117	Cow		
118	Peacock		
119	Lion		
120	Lobster		
121	Coat		
122	Balloon		
123	Heart		
124	Sled		
125	Cherry		
126	Umbrella		
127	Lamp		
128	Goat		
129	Hand		
130	Cigarette		
131	Elephant		
132	Light switch		
133	Mushroom		
134	Pen		
135	Tiger		
136	Bowl		
137	Rolling pin		
138	Pepper		
139	Pencil		
140	Vest		
141	Lemon		
142	Nail f ile		
143	Record player		
144	Necklace		
145	Traffic light		
146	Pitcher		
147	Toaster		
148	Basket		
149	Telephone		
150	Racoon		
Totals:			

No	item	response	code
151	Belt		
152	Comb		
153	Ring		
154	Screw		
155	Star		
156	Roller skate		
157	Lightbulb		
158	Moon		
159	Ear		
160	Ladder		
161	Pig		
162	Banana		
163	Owl		
164	Dog		
165	Penguin		
166	Well		
167	Blouse		
168	Flute		
169	Swing		
170	Nut		
171	Lettuce		
172	Thimble		
173	Table		
174	Cannon		
175	Hammer		
176	Hair		
177	Chicken		
178	Rabbit		
179	Cap		
180	Anchor		
181	Potato		
182	Giraffe		
183	Windmill		
184	Paintbrush		
185	Cigar		
186	Cake		
187	Cup		
188	Watch		
189	Sun		
190	Beetle		
191	Carrot		
192	Rhinoceros		
193	Grasshopper		
194	Nail		
195	Seal		
196	Caterpillar		
197	Whistle		
198	Leg		
199	Wagon		
200	Spider		
Totals:			

S&V word finding 1 page 2 Name: Date:

S&V word finding 1

No	item	response	code
201	Sock		
202	Dress		
203	Sailboat		
204	Arrow		
205	Bicycle		
206	Asparagus		
207	Leopard		
208	Motorcycle		
209	Celery		
210	Garbage can		
211	Chair		
212	Kite		
213	Scissors		
214	Pocket book		
215	Wineglass		
216	Jacket		
217	Needle		
218	Football		
219	Drum		
220	Lock		
221	Turtle		
222	Bell		
223	Squirrel		
224	Monkey		
225	Knife		
226	Saltshaker		
227	Bird		
228	Guitar		
229	Clock		
230	Orange		
231	Barrel		
232	Bus		
233	Snowman		
234	Mouse		
235	Camel		
236	Wrench		
237	Donkey		
238	Onion		
239	Glove		
240	Gun		
241	Chisel		
242	Flower		
243	Helicopter		
244	Football helmet		
245	Bear		
246	Bow		
247	Ostrich		
248	Box		
249	Baby carriage		
250	Snail		
Totals:			

	item	response	code
251	Broom		
252	Skirt		
253	Artichoke		
254	Button		
255	Pot		
256	Envelope		
257	Watermelon		
258	Fish		
259	Pliers		
260	Pear		
Totals:			

 Name: Date:

S&V word finding 2

No	item	response	code	No	item	response	code
1	Saw			51	Spinning wheel		
2	Guitar			52	Ironing board		
3	Seal			53	Rabbit		
4	Bird			54	Anchor		
5	Glass			55	Hand		
6	Balloon			56	House		
7	Piano			57	Cap		
8	Hammer			58	Screwdriver		
9	Snowman			59	Basket		
10	Sled			60	Donkey		
11	Grasshopper			61	Church		
12	Cat			62	Shoe		
13	Button			63	Toe		
14	Pliers			64	Cake		
15	Record player			65	Whistle		
16	Clown			66	Pen		
17	Ashtray			67	Truck		
18	Belt			68	Windmill		
19	Spider			69	Pumpkin		
20	Leg			70	Rooster		
21	Heart			71	Swan		
22	Chair			72	Goat		
23	Sweater			73	Train		
24	Tree			74	Dresser		
25	Pepper			75	Gun		
26	Bee			76	Onion		
27	Book			77	Pipe		
28	Ear			78	Sheep		
29	Deer			79	Ring		
30	Spoon			80	Bear		
31	Apple			81	Leopard		
32	Lemon			82	Carrot		
33	Sock			83	Peanut		
34	Umbrella			84	Eye		
35	Bread			85	Ball		
36	Hair			86	Caterpillar		
37	Chicken			87	Television		
38	Clock			88	Bowl		
39	Cherry			89	Camel		
40	Elephant			90	Potato		
41	Bus			91	Fork		
42	Rolling pin			92	Celery		
43	Snail			93	Pot		
44	Desk			94	Roller skate		
45	Mountain			95	Duck		
46	Bottle			96	Barrel		
47	Star			97	Jacket		
48	Boot			98	Cup		
49	Pineapple			99	Watermelon		
50	Football helmet			100	Hat		
Totals:				Totals:			

S&V word finding 2 page 1 Name: Date:

S&V word finding 2

No	item	response	code
101	Watering can		
102	Violin		
103	Asparagus		
104	Snake		
105	Shirt		
106	Mouse		
107	Chisel		
108	Tiger		
109	Cigar		
110	Mushroom		
111	Cigarette		
112	Fence		
113	Rocking chair		
114	Glove		
115	Butterfly		
116	Ostrich		
117	Skunk		
118	Giraffe		
119	Helicopter		
120	Doll		
121	Toaster		
122	Gorilla		
123	Bow		
124	Envelope		
125	Sailboat		
126	Flower		
127	Necklace		
128	Pencil		
129	Ruler		
130	Coat		
131	Nail file		
132	Refrigerator		
133	Arrow		
134	Iron		
135	Cannon		
136	Fish		
137	Watch		
138	Tie		
139	Fox		
140	Pants		
141	Lion		
142	Lock		
143	Racoon		
144	Flute		
145	Harp		
146	Wheel		
147	Peacock		
148	Frog		
149	Nut		
150	Monkey		
Totals:			

No	item	response	code
151	Door		
152	Thimble		
153	Traffic light		
154	Wagon		
155	Vase		
156	Nose		
157	Box		
158	Squirrel		
159	Kangaroo		
160	Crown		
161	Candle		
162	Sun		
163	Knife		
164	Cloud		
165	Glasses		
166	Plug		
167	Lettuce		
168	French horn		
169	Turtle		
170	Frying pan		
171	Skirt		
172	Bell		
173	Car		
174	Strawberry		
175	Blouse		
176	Drum		
177	Swing		
178	Brush		
179	Axe		
180	Football		
181	Well		
182	Tennis racket		
183	Thumb		
184	Cow		
185	Corn		
186	Scissors		
187	Dog		
188	Arm		
189	Dress		
190	Key		
191	Leaf		
192	Foot		
193	Spool of thread		
194	Glass		
195	Accordion		
196	Baby carriage		
197	Seahorse		
198	Banana		
199	Trumpet		
200	Top		
Totals:			

S&V word finding 2 page 2 Name: Date:

No	item	response	code
201	Lips		
202	Fly		
203	Needle		
204	Moon		
205	Peach		
206	Pocket book		
207	Paintbrush		
208	Airplane		
209	Motorcycle		
210	Barn		
211	Lobster		
212	Kettle		
213	Stove		
214	Window		
215	Comb		
216	Pig		
217	Lamp		
218	Mitten		
219	Bed		
220	Owl		
221	Bicycle		
222	Light switch		
223	Sandwich		
224	Telephone		
225	Tomato		
226	Saltshaker		
227	Alligator		
228	Screw		
229	Zebra		
230	Horse		
231	Clothespin		
232	Pitcher		
233	Orange		
234	Artichoke		
235	Garbage can		
236	Rhinoceros		
237	Grapes		
238	Flag		
239	Ant		
240	Kite		
241	Suitcase		
242	Broom		
243	Lightbulb		
244	Ladder		
245	Baseball bat		
246	Doorknob		
247	Vest		
248	Penguin		
249	Wrench		
250	Beetle		
Totals:			

	item	response	code
251	Stool		
252	Table		
253	Nail		
254	Eagle		
255	Couch		
256	Chain		
257	Finger		
258	Toothbrush		
259	Hanger		
260	Pear		
Totals:			

 Name: Date:

S&V word finding 3

No	item	response	code
1	Television		
2	Eye		
3	Box		
4	Leopard		
5	Frying pan		
6	Dresser		
7	Goat		
8	Truck		
9	Bottle		
10	Apple		
11	Saw		
12	Toothbrush		
13	Hammer		
14	Pepper		
15	Button		
16	Pipe		
17	Baby carriage		
18	Top		
19	Leaf		
20	Dog		
21	Tennis racket		
22	Pear		
23	Umbrella		
24	Frog		
25	Racoon		
26	Sun		
27	Tie		
28	Nail		
29	Arrow		
30	Doorknob		
31	Nail file		
32	Flag		
33	Ruler		
34	Envelope		
35	Toaster		
36	Ostrich		
37	Horse		
38	Tomato		
39	Light switch		
40	Cigarette		
41	Mouse		
42	Window		
43	Motorcycle		
44	Hat		
45	Airplane		
46	Hanger		
47	Lettuce		
48	Screwdriver		
49	Ironing board		
50	Pot		
Totals:			

No	item	response	code
51	Blouse		
52	Moon		
53	Lips		
54	Vase		
55	Squirrel		
56	Crown		
57	Skirt		
58	Train		
59	Swan		
60	Pen		
61	Mountain		
62	Spider		
63	Seal		
64	Balloon		
65	Grasshopper		
66	Tree		
67	Leg		
68	Onion		
69	Snail		
70	Trumpet		
71	Key		
72	Scissors		
73	Well		
74	Chicken		
75	Thimble		
76	Wheel		
77	Lock		
78	Candle		
79	Eagle		
80	Table		
81	Wrench		
82	Baseball bat		
83	Broom		
84	Grapes		
85	Pencil		
86	Bow		
87	Doll		
88	Skunk		
89	Zebra		
90	Telephone		
91	Bicycle		
92	Mushroom		
93	Shirt		
94	Stove		
95	Snake		
96	Watermelon		
97	Duck		
98	French horn		
99	Plug		
100	Shoe		
Totals:			

S&V word finding 3 page 1 Name: Date:

S&V word finding 3

No	item	response	code
101	Boot		
102	Celery		
103	Fly		
104	Bowl		
105	Traffic light		
106	Wagon		
107	Carrot		
108	Turtle		
109	Ring		
110	Donkey		
111	Rooster		
112	Whistle		
113	Cherry		
114	Belt		
115	Guitar		
116	Snowman		
117	Cat		
118	Sweater		
119	Book		
120	Gun		
121	Seahorse		
122	Wineglass		
123	Football helmet		
124	Corn		
125	Football		
126	Clock		
127	Monkey		
128	Harp		
129	Lion		
130	Chain		
131	Watch		
132	Stool		
133	Penguin		
134	Ladder		
135	Suitcase		
136	Rhinoceros		
137	Necklace		
138	Artichoke		
139	Giraffe		
140	Glove		
141	Screw		
142	Rocking chair		
143	Owl		
144	Cigar		
145	Lamp		
146	Kettle		
147	Asparagus		
148	Cup		
149	Alligator		
150	Rabbit		
Totals:			

No	item	response	code
151	Cake		
152	Cap		
153	Star		
154	Fork		
155	Swing		
156	Needle		
157	Caterpillar		
158	Peacock		
159	Peanut		
160	Kangaroo		
161	Bell		
162	Church		
163	Pumpkin		
164	Bus		
165	Bread		
166	Ashtray		
167	Bird		
168	Piano		
169	Pliers		
170	Chair		
171	Ear		
172	Desk		
173	Rolling pin		
174	Spool of thread		
175	Dress		
176	Cow		
177	Axe		
178	Sock		
179	Door		
180	Flute		
181	Pants		
182	Couch		
183	Fish		
184	Beetle		
185	Refrigerator		
186	Finger		
187	Kite		
188	Garbage can		
189	Flower		
190	Orange		
191	Butterfly		
192	Pitcher		
193	Brush		
194	Fence		
195	Bed		
196	Tiger		
197	Pig		
198	Lobster		
199	Violin		
200	Jacket		
Totals:			

S&V word finding 3 page 2 Name: Date:

S&V word finding 3

No	item	response	code
201	Roller skate		
202	Anchor		
203	Toe		
204	Hand		
205	Paintbrush		
206	Camel		
207	Drum		
208	Strawberry		
209	Ball		
210	Nose		
211	Hair		
212	Bear		
213	Cloud		
214	Glasses		
215	Windmill		
216	Elephant		
217	Sled		
218	Record player		
219	Glass		
220	Clown		
221	Bee		
222	Heart		
223	Deer		
224	Accordion		
225	Banana		
226	Foot		
227	Arm		
228	Thumb		
229	Spinning wheel		
230	Lemon		
231	Nut		
232	Spoon		
233	Knife		
234	Fox		
235	Cannon		
236	Iron		
237	Vest		
238	Light bulb		
239	Ant		
240	Coat		
241	Sailboat		
242	Gorilla		
243	Helicopter		
244	Clothespin		
245	Saltshaker		
246	Sandwich		
247	Mitten		
248	Chisel		
249	Comb		
250	Barn		
Totals:			

	item	response	code
251	Watering can		
252	Barrel		
253	Car		
254	House		
255	Basket		
256	Pineapple		
257	Pocket book		
258	Peach		
259	Sheep		
260	Potato		
Totals:			

S&V word finding 3 page 3 Name: Date:

Appendix 8

Spoken Word to Picture Matching Score Sheet and Sample Assessment Page for 37 Bear

S&V spoken word to picture matching

No	target		distractor		distractor		distractor		distractor	
1	Doorknob		Window		Light switch		Light bulb		Lock	
2	Apple		Pear		Grapes		Tomato		Orange	
3	Box		Pocket book		Suitcase		Barrel		Basket	
4	Wagon		Spinning top		Kite		Balloon		Swing	
5	Piano		Violin		Trumpet		French horn		Guitar	
6	Sock		Roller skate		Chain		Boot		Shoe	
7	Wrench		Pliers		Hammer		Nut		Axe	
8	Screw		Paintbrush		Nut		Wrench		Screwdriver	
9	Nail file		Clown		Brush		Toothbrush		Comb	
10	Cannon		Gun		Knife		Baseball bat		Bottle	
11	Pitcher		Fork		Bowl		Spoon		Glass	
12	Key		Ring		Umbrella		Necklace		Telephone	
13	Barn		Traffic light		Windmill		House		Church	
14	Foot		Arm		Ear		Thumb		Leg	
15	Frying pan		Pot		Vase		Rolling pin		Kettle	
16	Motorcycle		Bus		Car		Sailboat		Airplane	
17	Traffic light		Ladder		Mountain		Baby carriage		Wheel	
18	Pepper		Potato		Lettuce		Pumpkin		Carrot	
19	Roller skate		Shoe		Boot		Sock		Clown	
20	Cigarette		Arrow		Cigar		Pipe		Ashtray	
21	Ear		Foot		Hair		Toe		Leg	
22	Duck		Swan		Bird		Chicken		Owl	
23	Refrigerator		Clock		Toaster		Stove		Television	
24	Desk		Dresser		Table		Bed		Rocking chair	
25	Celery		Pepper		Artichoke		Asparagus		Potato	
26	Table		Bed		Desk		Couch		Table	
27	Deer		Sheep		Donkey		Horse		Pig	
28	Nail		Screw		Axe		Saw		Paintbrush	
29	Pencil		Arrow		Envelope		Ruler		Pen	
30	Lobster		Seahorse		Seal		Frog		Turtle	
31	Stove		Lamp		Record player		Toaster		Refrigerator	
32	Ashtray		Baby carriage		Cigar		Pipe		Cigarette	
33	Rooster		Eagle		Ostrich		Swan		Duck	
34	Bicycle		Ball		Tennis racket		Football		Sled	
35	Star		Moon		Cloud		Sun		Baby carriage	
36	Well		Garbage can		Flower		Watering can		Leaf	
37	Bear		Snail		Squirrel		Snake		Skunk	
38	Ant		Spider		Butterfly		Bee		Fly	
39	Comb		Nail file		Toothbrush		Brush		Plug	
40	Mountain		Plug		Book		Candle		Traffic light	
41	Dog		Cat		Rabbit		Mouse		Peacock	
42	Balloon		Kite		Swing		Wagon		Doll	
43	Kangaroo		Snail		Bear		Skunk		Snake	
44	Iron		Broom		Ironing board		Clothes pin		Hanger	
45	Bottle		Gun		Knife		Cannon		Baseball bat	
46	Ostrich		Owl		Rooster		Swan		Eagle	
47	Spool of thread		Scissors		Needle		Button		Thimble	
48	Bell		Guitar		Trumpet		Flute		Harp	
49	Lips		Heart		Arm		Eye		Nose	
50	Caterpillar		Bee		Spider		Beetle		Butterfly	
Totals:										

S&V spoken word to picture matching page 1 Name: Date:

S&V spoken word to picture matching

No	target		distractor		distractor		distractor		distractor	
51	Television		Stove		Lamp		Toaster		Refrigerator	
52	Monkey		Lion		Gorilla		Elephant		Giraffe	
53	Fly		Caterpillar		Grasshopper		Butterfly		Beetle	
54	Record player		Television		Lamp		Stove		Clock	
55	Lion		Rhinoceros		Gorilla		Zebra		Tiger	
56	Scissors		Needle		Spool of thread		Button		Thimble	
57	Pineapple		Strawberry		Tomato		Watermelon		Grapes	
58	Pot		Rolling pin		Candle		Kettle		Frying pan	
59	Cherry		Watermelon		Pear		Pineapple		Lemon	
60	Tie		Glove		Blouse		Vest		Mitten	
61	Wineglass		Pitcher		Saltshaker		Cup		Bowl	
62	Couch		Rocking chair		Dresser		Bed		Chair	
63	Snowman		Vase		Spinning wheel		Traffic light		Wheel	
64	Window		Light switch		Door		Door knob		Lightbulb	
65	Watch		Umbrella		Ring		Key		Necklace	
66	Seahorse		Lobster		Turtle		Seal		Alligator	
67	Chair		Dresser		Bed		Stool		Table	
68	Tiger		Gorilla		Giraffe		Rhinoceros		Leopard	
69	Skunk		Camel		Kangaroo		Snake		Fox	
70	Windmill		Church		Baby carriage		Barn		House	
71	Hand		Arm		Nose		Heart		Toe	
72	Garbage can		Fence		Tree		Well		Leaf	
73	Bread		Fish		Sandwich		Cake		Peanut	
74	Toaster		Lamp		Record player		Refrigerator		Clock	
75	Zebra		Rhinoceros		Lion		Monkey		Elephant	
76	Umbrella		Necklace		Telephone		Glasses		Watch	
77	Chisel		Screwdriver		Pliers		Hammer		Ladder	
78	Sun		Star		Anchor		Moon		Cloud	
79	Door		Window		Light switch		Lock		Doorknob	
80	Pliers		Axe		Hammer		Screwdriver		Wrench	
81	Snail		Squirrel		Racoon		Kangaroo		Bear	
82	Plug		Whistle		Plug		Traffic light		Spinning wheel	
83	Owl		Ostrich		Bird		Swan		Eagle	
84	Coat		Pants		Vest		Glove		Skirt	
85	Onion		Celery		Pumpkin		Artichoke		Corn	
86	Lock		Door		Light switch		Window		Light bulb	
87	Tennis racket		Football		Ball		Sled		Bicycle	
88	Finger		Lips		Leg		Hand		Thumb	
89	Envelope		Spinning wheel		Pencil		Pen		Ruler	
90	Bird		Rooster		Duck		Owl		Eagle	
91	Airplane		Truck		motorcycle		Dress		Coat	
92	Clock		Toaster		Record player		Helicopter		Car	
93	Belt		Jacket		Skirt		Glove		Dress	
94	Telephone		Glasses		Key		Necklace		Ring	
95	Saltshaker		Wineglass		Fork		Cup		Spoon	
96	Candle		Mountain		Anchor		Flag		Plug	
97	Spider		Ant		Fly		Beetle		Caterpillar	
98	Hanger		Clothes pin		Iron		Ironing board		Broom	
99	Top		Doll		Balloon		Swing		Kite	
100	Cow		Sheep		Pig		Deer		Goat	
Totals:										

S&V spoken word to picture matching page 2 Name: Date:

S&V spoken word to picture matching

No	Target		distractor		distractor		distractor		distractor	
101	Baby carriage		Flag		Mountain		Spinning wheel		Wheel	
102	Rabbit		Cat		Peacock		Dog		Mouse	
103	Hair		Thumb		Hand		Heart		Eye	
104	Racoon		Fox		Bear		Snake		Camel	
105	Paintbrush		Saw		Screw		Nail		Chisel	
106	Arm		Eye		Lips		Foot		Thumb	
107	Broom		Ironing board		Iron		Hanger		Clothes pin	
108	Boot		Sock		Whistle		Traffic light		Shoe	
109	Mushroom		Asparagus		Pepper		Corn		Carrot	
110	Church		House		Barn		Windmill		Snowman	
111	Alligator		Seal		Frog		Lobster		Seahorse	
112	Baseball bat		Cannon		Gun		Bottle		Knife	
113	Ball		Bicycle		Football		Sled		Tennis racket	
114	Peacock		Mouse		Dog		Rabbit		Cat	
115	Truck		Helicopter		Bus		Sailboat		airplane	
116	Chain		Wheel		Ladder		Clown		Book	
117	Sweater		Shirt		Coat		Tie		Pants	
118	Spinning wheel		Flag		Snowman		Ladder		Whistle	
119	Button		Needle		Scissors		Spool of thread		Thimble	
120	Doll		Wagon		Top		Balloon		Swing	
121	Accordion		Bell		Piano		Harp		French horn	
122	Knife		Bottle		Baseball bat		Gun		Cannon	
123	Fork		Spoon		Wineglass		Pitcher		Glass	
124	Pig		Deer		Goat		Sheep		Cow	
125	Eye		Finger		Ear		Foot		Hand	
126	Book		Candle		Arrow		Ladder		Mountain	
127	Sheep		Goat		Horse		Donkey		Deer	
128	Cloud		Sun		Star		Moon		Book	
129	Moon		Sun		Star		Snowman		Cloud	
130	Carrot		Mushroom		Onion		Corn		Lettuce	
131	Bowl		Glass		Wineglass		Cup		Saltshaker	
132	Pear		Banana		Tomato		Cherry		Orange	
133	Gun		Bottle		Cannon		Baseball bat		Knife	
134	Eagle		Chicken		Ostrich		Rooster		Bird	
135	Cat		Dog		Rabbit		Peacock		Mouse	
136	Donkey		Deer		Cow		Goat		Sheep	
137	Drum		Bell		Harp		Accordion		Flute	
138	Goat		Pig		Horse		Cow		Donkey	
139	Penguin		Eagle		Owl		Duck		Swan	
140	Ironing board		Hanger		Iron		Broom		Clothes pin	
141	Rocking chair		Stool		Chair		Table		Desk	
142	Fence		Tree		Leaf		Garbage can		Watering can	
143	Glasses		Ring		Watch		Key		Umbrella	
144	Lettuce		Artichoke		Mushroom		Carrot		Asparagus	
145	Lamp		Record player		Stove		Television		Clock	
146	Pen		Envelope		Book		Pencil		Ruler	
147	Toe		Leg		Hair		Lips		Thumb	
148	Giraffe		Zebra		Lion		Tiger		Elephant	
149	Hammer		Chisel		Ladder		Saw		Screwdriver	
150	Mouse		Peacock		Cat		Dog		Rabbit	
Totals:										

S&V spoken word to picture matching page 3   Name: Date:

S&V spoken word to picture matching

No	Target		distractor		distractor		distractor		distractor	
151	Kettle		Rolling pin		Frying pan		Book		Pot	
152	Thumb		Toe		Arm		Eye		Foot	
153	Whistle		Chain		Candle		Mountain		Anchor	
154	Guitar		Piano		Accordion		Trumpet		Violin	
155	Turtle		Alligator		Frog		seahorse		Lobster	
156	Harp		Bell		Drum		Piano		Flute	
157	Dress		Sweater		Jacket		Pants		Shirt	
158	Fox		Skunk		Racoon		Camel		Snail	
159	Pocket book		Box		Suitcase		Barrel		Basket	
160	Horse		Donkey		Cow		Deer		Pig	
161	Cup		Bowl		Wineglass		Saltshaker		jug	
162	Car		Truck		Helicopter		Motorcycle		Train	
163	Train		Motorcycle		Bus		Sailboat		Truck	
164	Stool		Rocking chair		Couch		Table		Dresser	
165	Vase		Clown		Arrow		Chain		Flag	
166	Necklace		Glasses		Watch		Telephone		Key	
167	Artichoke		Lettuce		Potato		Celery		Pepper	
168	Pumpkin		Artichoke		Lettuce		Asparagus		Celery	
169	Axe		Hammer		Nail		Ladder		Chisel	
170	Tomato		Lemon		Apple		Pineapple		Peach	
171	Saw		Screw		Axe		Nail		Wrench	
172	Basket		Pocket book		Barrel		Suitcase		Box	
173	Watering can		Garbage can		Tree		Flower		Fence	
174	Cigar		Flag		Pipe		Ashtray		Cigarette	
175	Arrow		Whistle		Flag		Wheel		Clown	
176	Light bulb		Doorknob		Lock		Door		Window	
177	Mitten		Glove		Skirt		Tie		Pants	
178	Football		Ball		Sled		Bicycle		Tennis racket	
179	Fish		Cake		Bread		Sandwich		Peanut	
180	Cake		Peanut		Fish		Sandwich		Bread	
181	Blouse		Glove		Dress		Sweater		Belt	
182	Vest		Tie		Glove		Mitten		Blouse	
183	Shoe		Snowman		Sock		Boot		Roller skate	
184	Rhinoceros		Tiger		Monkey		Leopard		Elephant	
185	Cap		Football helmet		Hat		Crown		Bow	
186	Anchor		Vase		Mountain		Plug		Chain	
187	Clothes pin		Iron		Broom		Ironing board		Hanger	
188	Flute		French horn		Trumpet		Violin		Accordion	
189	Rolling pin		Kettle		Frying pan		Chain		Pot	
190	Helicopter		Airplane		Truck		Train		Car	
191	Lemon		Tomato		Apple		Banana		Peach	
192	Sandwich		Fish		Peanut		Bread		Cake	
193	Kite		Doll		Top		Wagon		Swing	
194	Ladder		Paintbrush		Nail		Saw		Screw	
195	Barrel		Suitcase		Basket		Pocket book		Box	
196	Thimble		Button		Spool of thread		Scissors		Needle	
197	Jacket		Shirt		Vest		Coat		Mitten	
198	Toothbrush		Candle		Nail file		Brush		Comb	
199	French horn		Violin		Guitar		Drum		Bell	
200	Sailboat		Helicopter		Car		Bus		Train	
Totals:										

S&V spoken word to picture matching page 4 Name: Date:

S&V spoken word to picture matching

No	Target		distractor		distractor		distractor		distractor	
201	Seal		Frog		Turtle		Alligator		Lobster	
202	Butterfly		Ant		Spider		Grasshopper		Fly	
203	Light switch		Light bulb		Doorknob		Lock		Door	
204	Strawberry		Watermelon		Banana		Apple		Lemon	
205	Flower		Watering can		Leaf		Well		Fence	
206	Swing		Balloon		Wagon		Top		Kite	
207	Beetle		Caterpillar		Spider		Grasshopper		Bee	
208	Swan		Rooster		Chicken		Duck		Bird	
209	House		Church		Mountain		Windmill		Barn	
210	Pants		Blouse		Jacket		Belt		Skirt	
211	Shirt		Blouse		Skirt		Dress		Coat	
212	Snake		Kangaroo		Skunk		Racoon		Squirrel	
213	Grasshopper		Beetle		Fly		Bee		Ant	
214	Corn		Celery		Onion		Pumpkin		Potato	
215	Hat		Crown		Cap		Bow		Football helmet	
216	Needle		Thimble		Spool of thread		Button		Scissors	
217	Banana		Strawberry		Peach		Pineapple		Cherry	
218	Violin		Guitar		Flute		Drum		Accordion	
219	Crown		Cap		Football helmet		Bow		Hat	
220	Clown		Snowman		Whistle		Baby carriage		Anchor	
221	Bow		Cap		Hat		Football helmet		Crown	
222	Leaf		Well		tree		Garbage can		Flower	
223	Watermelon		Banana		Orange		Cherry		Grape	
224	Trumpet		Drum		Harp		Piano		French horn	
225	Dresser		Desk		Stool		Couch		Chair	
226	Screwdriver		Screw		Pliers		Chisel		Nut	
227	Pipe		Cigarette		Ashtray		Cigar		Wheel	
228	Flag		Anchor		Ladder		Spinning wheel		Arrow	
229	Chicken		Ostrich		Owl		Eagle		Rooster	
230	Finger		Lips		Leg		Hand		Thumb	
231	Camel		Squirrel		Skunk		Fox		Kangaroo	
232	Elephant		Leopard		Zebra		Gorilla		Monkey	
233	Bed		Desk		Table		Couch		Rocking chair	
234	Peach		Grapes		Strawberry		Pear		Apple	
235	Frog		Alligator		Seahorse		Turtle		Seal	
236	Nut		saw		Paintbrush		Wrench		Nail	
237	Glass		Bowl		Pitcher		Wineglass		Fork	
238	Grapes		Orange		Tomato		Strawberry		Peach	
239	Spoon		Glass		Cup		Fork		Pitcher	
240	Nose		Finger		Heart		Hand		Ear	
241	Bus		Motorcycle		Train		Airplane		Sailboat	
242	Leg		Ear		Finger		Nose		Lips	
243	Brush		Vase		Nail file		Comb		Toothbrush	
244	Football helmet		Bow		Crown		Cap		Hat	
245	Orange		Pineapple		Cherry		Lemon		Watermelon	
246	Tree		Flower		Fence		Watering can		Well	
247	Glove		Mitten		Shirt		Vest		Tie	
248	Potato		Celery		Corn		Onion		Mushroom	
249	Leopard		Monkey		Zebra		Rhinoceros		Giraffe	
250	Gorilla		Leopard		Tiger		Lion		giraffe	
Totals:										

S&V spoken word to picture matching page 5 Name: Date:

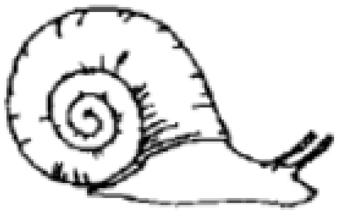
S&V spoken word to picture matching

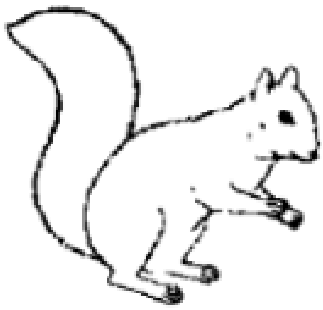
No	target		distractor		distractor		distractor		distractor	
251	Sled		Bicycle		Tennis racket		Ball		Football	
252	Squirrel		Bear		Snail		Fox		camel	
253	Ring		Umbrella		Glasses		Watch		Telephone	
254	Peanut		Cake		Bread		Sandwich		Fish	
255	Skirt		Belt		Dress		Sweater		Vest	
256	Bee		Grasshopper		Ant		Caterpillar		Spider	
257	Wheel		Ladder		Flag		Arrow		Clown	
258	Heart		Toe		Nose		Hair		Finger	
259	Ruler		Pen		Envelope		Pencil		Anchor	
260	Suitcase		Pocket book		Barrel		Basket		Box	

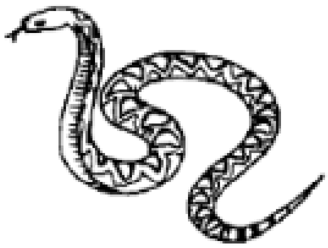
Totals

Start time: Time:
Finish time:

S&V spoken word to picture matching







Appendix 9

Written Word to Picture Matching Score Sheet and Assessment Page for 11 Motorcycle

S&V written word to picture matching

No	target		distractor		distractor		distractor		distractor	
1	Deer		Sheep		Donkey		Horse		Pig	
2	Chicken		Ostrich		Owl		Eagle		Rooster	
3	Lettuce		Artichoke		Mushroom		Carrot		Asparagus	
4	Cherry		Watermelon		Pear		Pineapple		Lemon	
5	Iron		Broom		Ironing board		Clothes pin		Hanger	
6	Football helmet		Bow		Crown		Cap		Hat	
7	Light switch		Lightbulb		Doorknob		Lock		Door	
8	Clothes pin		Iron		Broom		Ironing board		Hanger	
9	Bee		Grasshopper		Ant		Caterpillar		Spider	
10	Crown		Cap		Football helmet		Bow		Hat	
11	Motorcycle		Bus		Car		Sailboat		Airplane	
12	Butterfly		Ant		Spider		Grasshopper		Fly	
13	Corn		Celery		Onion		Pumpkin		Potato	
14	Camel		Squirrel		Skunk		Fox		Kangaroo	
15	Baseball bat		Cannon		Gun		Bottle		Knife	
16	Ashtray		Baby carriage		Cigar		Pipe		Cigarette	
17	Box		Pocket book		Suitcase		Barrel		Basket	
18	Nose		Finger		Heart		Hand		Ear	
19	Dog		Cat		Rabbit		Mouse		Peacock	
20	Airplane		Truck		Motorcycle		Helicopter		Car	
21	Pitcher		Fork		Bowl		Spoon		Glass	
22	Bread		Fish		Sandwich		Cake		Peanut	
23	Rooster		Eagle		Ostrich		Swan		Duck	
24	Eagle		Chicken		Ostrich		Rooster		Bird	
25	Sheep		Goat		Horse		Donkey		Deer	
26	Glasses		Ring		Watch		Key		Umbrella	
27	Pencil		Arrow		Envelope		Ruler		Pen	
28	Peanut		Cake		Bread		Sandwich		Fish	
29	Flag		Anchor		Ladder		Spinning wheel		Arrow	
30	Screwdriver		Screw		Pliers		Chisel		Nut	
31	Book		Candle		Arrow		Ladder		Mountain	
32	Harp		Bell		Drum		Piano		Flute	
33	Fork		Spoon		Wineglass		Pitcher		Glass	
34	Pumpkin		Artichoke		Lettuce		Asparagus		Celery	
35	Belt		Jacket		Skirt		Glove		Dress	
36	Car		Truck		Helicopter		Motorcycle		Train	
37	Mouse		Peacock		Cat		Dog		Rabbit	
38	Trumpet		Drum		Harp		Piano		French horn	
39	Mitten		Glove		Skirt		Tie		Pants	
40	Rolling pin		Kettle		Frying pan		Chain		Pot	
41	Ironing board		Hanger		Iron		Broom		Clothes pin	
42	Potato		Celery		Corn		Onion		Mushroom	
43	Glove		Mitten		Shirt		Vest		Tie	
44	Cap		Football helmet		Hat		Crown		Bow	
45	Bicycle		Ball		Tennis racket		Football		Sled	
46	Cow		Sheep		Pig		Deer		Goat	
47	Helicopter		Airplane		Truck		Train		Car	
48	Pipe		Cigarette		Ashtray		Cigar		Wheel	
49	Barn		Traffic light		Windmill		House		Church	
50	Grapes		Orange		Tomato		Strawberry		Peach	
Totals:										

S&V written word to picture matching page 1 Name: Date:

S&V written word to picture matching

No	target		distractor		distractor		distractor		distractor	
51	Needle		Thimble		Thread		Button		Scissors	
52	Sandwich		Fish		Peanut		Bread		Cake	
53	Fly		Caterpillar		Grasshopper		Butterfly		Beetle	
54	Squirrel		Bear		Snail		Fox		Camel	
55	Gun		Bottle		Cannon		Baseball bat		Knife	
56	Snail		Squirrel		Racoon		Kangaroo		Bear	
57	Toe		Leg		Hair		Lips		Thumb	
58	Drum		Bell		Harp		Accordion		Flute	
59	Bird		Rooster		Duck		Owl		Eagle	
60	Cigar		Flag		Pipe		Ashtray		Cigarette	
61	Spinning wheel		Flag		Snowman		Ladder		Whistle	
62	Leopard		Monkey		Zebra		Rhinoceros		Giraffe	
63	Seahorse		Lobster		Turtle		Seal		Alligator	
64	Lightbulb		Doorknob		Lock		Door		Window	
65	Tiger		Gorilla		Giraffe		Rhinoceros		Leopard	
66	Bottle		Gun		Knife		Cannon		Baseball bat	
67	Horse		Donkey		Cow		Deer		Pig	
68	Paintbrush		Saw		Screw		Nail		Chisel	
69	Seal		Frog		Turtle		Alligator		Lobster	
70	Desk		Dresser		Table		Bed		Rocking chair	
71	Bow		Cap		Hat		Football helmet		Crown	
72	Tomato		Lemon		Apple		Pineapple		peach	
73	Garbage can		Fence		Tree		Well		Leaf	
74	Pear		Banana		Tomato		Cherry		Orange	
75	Donkey		Deer		Cow		Goat		Sheep	
76	Baby carriage		Flag		Mountain		Spinning wheel		Wheel	
77	Swan		Rooster		Chicken		Duck		Bird	
78	Refrigerator		Television		Lamp		Stove		Clock	
79	Barrel		Suitcase		Basket		Pocket book		Box	
80	Well		Garbage can		Flower		Watering can		Leaf	
81	Duck		Swan		Bird		Chicken		Owl	
82	Stove		Lamp		Record player		Toaster		Refrigerator	
83	Eye		Finger		Ear		Foot		Hand	
84	Snake		Kangaroo		Skunk		Racoon		Squirrel	
85	Flute		French horn		Trumpet		Violin		Accordion	
86	Cat		Dog		Rabbit		Peacock		Mouse	
87	Hair		Thumb		Hand		Heart		Eye	
88	Wrench		Pliers		Hammer		Nut		Axe	
89	Caterpillar		Bee		Spider		Beetle		Butterfly	
90	Toaster		Lamp		Record player		Refrigerator		Clock	
91	Rhinoceros		Tiger		Monkey		Leopard		Elephant	
92	House		Church		Mountain		Windmill		Barn	
93	French horn		Violin		Guitar		Drum		Bell	
94	Watering can		Garbage can		Tre		Flower		Fence	
95	Pen		Envelope		Book		Pencil		Ruler	
96	Moon		Sun		Star		Snowman		Cloud	
97	Hat		Crown		Cap		Bow		Football helmet	
98	Pineapple		Strawberry		Tomato		Watermelon		Grapes	
99	Knife		Bottle		Baseball bat		Gun		Cannon	
100	Cake		Peanut		Fish		Sandwich		Bread	
Totals:										

S&V written word to picture matching page 2 Name: Date:

S&V written word to picture matching

No	Target		distractor		distractor		distractor		distractor	
101	Salt shaker		Wineglass		Fork		Cup		Spoon	
102	Ladder		Paintbrush		Nail		Saw		Screw	
103	Grasshopper		Beetle		Fly		Bee		Ant	
104	Nut		Saw		Paintbrush		Wrench		Nail	
105	Tree		Flower		Fence		Watering can		Well	
106	Chisel		Screwdriver		Ladder		Hammer		Wrench	
107	Sock		Roller skate		Chain		Boot		Shoe	
108	Window		Light switch		Door		Doorknob		Lightbulb	
109	Elephant		Leopard		Zebra		Gorilla		Monkey	
110	Sled		Bicycle		Tennis racket		Ball		Football	
111	Peacock		Mouse		Dog		Rabbit		Cat	
112	Carrot		Mushroom		Onion		Corn		Lettuce	
113	Ant		Spider		Butterfly		Bee		Fly	
114	Turtle		Alligator		Frog		Seahorse		Lobster	
115	Penguin		Eagle		Owl		Duck		Swan	
116	Fox		Skunk		Racoon		Camel		Snail	
117	Saw		Screw		Axe		Nail		Wrench	
118	Boot		Sock		Whistle		Traffic light		Shoe	
119	Record player		Television		Lamp		Stove		Clock	
120	Artichoke		Lettuce		Potato		Celery		Pepper	
121	Envelope		Spinning wheel		Pencil		Pen		Ruler	
122	Frying pan		Pot		Vase		Rolling pin		Kettle	
123	Vase		Clown		Arrow		Chain		Flag	
124	Flower		Watering can		Leaf		Well		Fence	
125	Brush		Vase		Nail file		Comb		Toothbrush	
126	Vest		Tie		Glove		Mitten		Blouse	
127	Strawberry		Watermelon		Banana		Apple		Lemon	
128	Cloud		Sun		Star		Moon		Book	
129	Balloon		Kite		Swing		Wagon		Doll	
130	Button		Needle		Scissors		Spool of thread		Thimble	
131	Arm		Eye		Lips		Foot		Thumb	
132	Beetle		Caterpillar		Spider		Grasshopper		Bee	
133	Accordion		Bell		Piano		Harp		French horn	
134	Sun		Star		Anchor		Moon		Cloud	
135	Monkey		Lion		Gorilla		Elephant		Giraffe	
136	Top		Doll		Balloon		Swing		Kite	
137	Comb		Nail file		Toothbrush		Brush		Plug	
138	Heart		Toe		Nose		Hair		Finger	
139	Ring		Umbrella		Glasses		Watch		Telephone	
140	Guitar		Piano		Accordion		Trumpet		Violin	
141	Plug		Whistle		Plug		Traffic light		Spinning wheel	
142	Telephone		Glasses		Key		Necklace		Ring	
143	Anchor		Vase		Mountain		Plug		Chain	
144	Mountain		Plug		Book		Candle		Traffic light	
145	Lamp		Record player		Stove		Television		Clock	
146	Goat		Pig		Horse		Cow		Donkey	
147	Pig		Deer		Goat		Sheep		Cow	
148	Bed		Desk		Table		Couch		Rocking chair	
149	Sailboat		Helicopter		Car		Bus		Train	
150	Bell		Guitar		Trumpet		Flute		Harp	
Totals:										

S&V written word to picture matching

No	Target		distractor		distractor		distractor		distractor	
151	Asparagus		Carrot		Onion		Mushroom		Onion	
152	Star		Moon		Cloud		Sun		Baby carriage	
153	Necklace		Glasses		Watch		Telephone		Key	
154	Spool of thread		Scissors		Needle		Button		Thimble	
155	Cannon		Gun		Knife		Baseball bat		Bottle	
156	Umbrella		Necklace		Telephone		Glasses		Watch	
157	Leg		Ear		Finger		Nose		Lips	
158	Swing		Balloon		Wagon		Top		Kite	
159	Clock		Toaster		Record player		Refrigerator		Television	
160	Lion		Rhinoceros		Gorilla		Zebra		Tiger	
161	Whistle		Chain		Candle		Mountain		Anchor	
162	Finger		Lips		Leg		Hand		Thumb	
163	Wheel		Ladder		Flag		Arrow		Clown	
164	Cup		Bowl		Wineglass		Saltshaker		Jug	
165	Doorknob		Window		Light switch		Lightbulb		Lock	
166	Pepper		Potato		Lettuce		Pumpkin		Carrot	
167	Banana		Strawberry		Peach		Pineapple		Cherry	
168	Bear		Snail		Squirrel		Snake		Skunk	
169	Onion		Celery		Pumpkin		Artichoke		Corn	
170	Kite		Doll		Top		Wagon		Swing	
171	Television		Stove		Lamp		Toaster		Refrigerator	
172	Dress		Sweater		Jacket		Pants		Shirt	
173	Pants		Blouse		Jacket		Belt		Skirt	
174	Chair		Dresser		Bed		Stool		Table	
175	Hand		Arm		Nose		Heart		Toe	
176	Pliers		Axe		Hammer		Screwdriver		Wrench	
177	Watch		Umbrella		Ring		Key		Necklace	
178	Blouse		Glove		Dress		Sweater		Belt	
179	Tennis racket		Football		Ball		Sled		Bicycle	
180	Apple		Pear		Grapes		Tomato		Orange	
181	Zebra		Rhinoceros		Lion		Monkey		Elephant	
182	Lock		Door		Light switch		Window		Lightbulb	
183	Racoon		Fox		Bear		Snake		Camel	
184	Bus		Motorcycle		Train		Airplane		Sailboat	
185	Wineglass		Pitcher		Salt shaker		Cup		Bowl	
186	Skirt		Belt		Dress		Sweater		Vest	
187	Arrow		Whistle		Flag		Wheel		Clown	
188	Scissors		Needle		Spool of thread		Button		Thimble	
189	Foot		Arm		Ear		Thumb		Leg	
190	Rocking chair		Stool		Chair		Table		Desk	
191	Couch		Rocking chair		Dresser		Bed		Chair	
192	Fence		Tree		Leaf		Garbage can		Watering can	
193	Pocket book		Box		Suitcase		Barrel		Basket	
194	Frog		Alligator		Seahorse		Turtle		Seal	
195	Giraffe		Zebra		Lion		Tiger		Elephant	
196	Mushroom		Asparagus		Pepper		Corn		Carrot	
197	Bowl		Glass		wineglass		Cup		Saltshaker	
198	Key		Ring		Umbrella		Necklace		Telephone	
199	Piano		Violin		Trumpet		French horn		Guitar	
200	Nail file		Clown		Brush		Toothbrush		Comb	
Totals:										

S&V written word to picture matching page 4 Name: Date:

S&V written word to picture matching

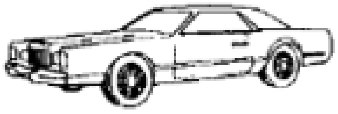
No	Target		distractor		distractor		distractor		distractor	
201	Ruler		Pen		Envelope		Pencil		Anchor	
202	Celery		Pepper		Artichoke		Asparagus		Potato	
203	Snowman		Vase		Spinning wheel		Traffic light		Wheel	
204	Leaf		Well		Tree		Garbage can		Flower	
205	Shirt		Blouse		Skirt		Dress		Coat	
206	Glass		Bowl		Pitcher		Wineglass		Fork	
207	Table		Bed		Desk		Chair		Couch	
208	Spoon		Glass		Cup		Fork		Pitcher	
209	Kettle		Rolling pin		Frying pan		Book		Pot	
210	Violin		Guitar		Flute		Drum		Accordion	
211	Thumb		Toe		Arm		Eye		Foot	
212	Kangaroo		Snail		Bear		Skunk		Snake	
213	Stool		Rocking chair		Couch		Table		Dresser	
214	Orange		Pineapple		Cherry		Lemon		Watermelon	
215	Sweater		Shirt		Coat		Tie		Pants	
216	Hammer		Chisel		Ladder		Saw		Screwdriver	
217	Wagon		Top		Kite		Balloon		Swing	
218	Spider		Ant		Fly		Beetle		Caterpillar	
219	Doll		Wagon		Top		Balloon		Swing	
220	Train		Motorcycle		Bus		Sailboat		Truck	
221	Traffic light		Ladder		Mountain		Baby carriage		Wheel	
222	Coat		Pants		Vest		Glove		Skirt	
223	Axe		Hammer		Nail		Ladder		Chisel	
224	Toothbrush		Candle		Nail file		Brush		Comb	
225	Suitcase		Pocket book		Barrel		Basket		Box	
226	Rabbit		Cat		Peacock		Dog		Mouse	
227	Ostrich		Owl		Rooster		Swan		Eagle	
228	Thimble		Button		Spool of thread		Scissors		Needle	
229	Ear		Foot		Hair		Toe		Leg	
230	Truck		Helicopter		Bus		Sailboat		Airplane	
231	Skunk		Camel		Kangaroo		Snake		Fox	
232	Tie		Glove		Blouse		Vest		Mitten	
233	Basket		Pocket book		Barrel		Suitcase		Box	
234	Watermelon		Banana		Orange		Cherry		Grapes	
235	Windmill		Church		Baby carriage		Barn		House	
236	Shoe		Snowman		Sock		Boot		Roller skate	
237	Football		Ball		Sled		Bicycle		Tennis racket	
238	Screw		Paintbrush		Nut		Wrench		Screwdriver	
239	Owl		Ostrich		Bird		Swan		Duck	
240	Fish		Cake		Bread		Sandwich		Peanut	
241	Roller skate		Shoe		Boot		Sock		Clown	
242	Gorilla		Leopard		Tiger		Lion		Giraffe	
243	Pot		Rolling pin		Candle		Kettle		Frying pan	
244	Lobster		Seahorse		Seal		Frog		Turtle	
245	Jacket		Shirt		Vest		Coat		Mitten	
246	Candle		Mountain		Anchor		Flag		Plug	
247	Cigarette		Arrow		Cigar		Pipe		Ashtray	
248	Chain		Wheel		Ladder		Clown		Book	
249	Broom		Ironing board		Iron		Hanger		Clothespin	
250	Alligator		Seal		Frog		Lobster		Seahorse	
Totals:										

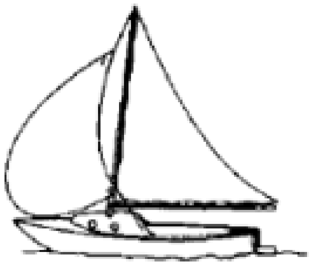
S&V written word to picture matching page 5 Name: Date:

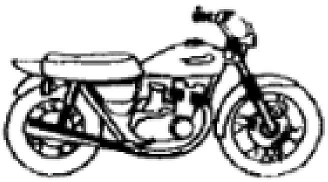
S&V written word to picture matching

No	target		distractor		distractor		distractor		distractor	
251	Church		House		Barn		Windmill		Snowman	
252	Lemon		Tomato		Apple		Banana		Peach	
253	Nail		Screw		Axe		Saw		Paintbrush	
254	Door		Window		Light switch		Lightbulb		Lock	
255	Clown		Snowman		Whistle		Baby carriage		Anchor	
256	Dresser		Desk		Stool		Couch		Chair	
257	Lips		Heart		Arm		Eye		Nose	
258	Hanger		Clothes pin		Iron		Ironing board		Broom	
259	Ball		Bicycle		Football		Sled		Tennis racket	
260	Peach		Grapes		Strawberry		Pear		Apple	
Totals										
Start time: Finish time:						Time:				

motorcycle







Appendix 10

Sample Written Word Score Sheet and Sample Assessment Page for 181 Rocking Chair

S&V written word finding response sheet

1	
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S&V written word finding page 1 Name: Date:

Appendix 11

Repetition Assessment

S&V repetition

No	item	response	code
1	Bow		
2	Lettuce		
3	Trumpet		
4	Bus		
5	Peach		
6	Dresser		
7	Clown		
8	Scissors		
9	Banana		
10	Frog		
11	Corn		
12	Glass		
13	Swing		
14	Jacket		
15	Peanut		
16	Shoe		
17	Leaf		
18	House		
19	Pants		
20	Nut		
21	Snake		
22	Wineglass		
23	Cherry		
24	Football helmet		
25	Barrel		
26	Bed		
27	Watermelon		
28	Saw		
29	Cow		
30	Vase		
31	Flute		
32	Watering can		
33	Ladder		
34	Pumpkin		
35	Lightbulb		
36	Football		
37	Artichoke		
38	Blouse		
39	Grasshopper		
40	Vest		
41	Turtle		
42	Hammer		
43	Fish		
44	Flag		
45	Sailboat		
46	Car		
47	Stool		
48	Basket		
49	Anchor		
50	Mitten		
Totals:			

No	item	response	code
51	Seal		
52	Fox		
53	Elephant		
54	French horn		
55	Ball		
56	Spoon		
57	Train		
58	Giraffe		
59	Tiger		
60	Necklace		
61	Tomato		
62	Cup		
63	Sled		
64	Cap		
65	Nose		
66	Lemon		
67	Wheel		
68	Ironing board		
69	Ring		
70	Clothes pin		
71	Bee		
72	Orange		
73	Gun		
74	Pen		
75	Window		
76	Cloud		
77	Toe		
78	Glove		
79	Kite		
80	Swan		
81	Fence		
82	Thimble		
83	Butterfly		
84	Chicken		
85	Toothbrush		
86	Helicopter		
87	Rocking chair		
88	Kettle		
89	Lamp		
90	Goat		
91	Squirrel		
92	Donkey		
93	Carrot		
94	Penguin		
95	Seahorse		
96	Rhinoceros		
97	Baby carriage		
98	Doll		
99	Racoon		
100	Cake		
Totals:			

S&V repetition   page 1   Name: Date:

S&V repetition

No	item	response	code
1	Bow		
2	Lettuce		
3	Trumpet		
4	Bus		
5	Peach		
6	Dresser		
7	Clown		
8	Scissors		
9	Banana		
10	Frog		
11	Corn		
12	Glass		
13	Swing		
14	Jacket		
15	Peanut		
16	Shoe		
17	Leaf		
18	House		
19	Pants		
20	Nut		
21	Snake		
22	Wineglass		
23	Cherry		
24	Football helmet		
25	Barrel		
26	Bed		
27	Watermelon		
28	Saw		
29	Cow		
30	Vase		
31	Flute		
32	Watering can		
33	Ladder		
34	Pumpkin		
35	Lightbulb		
36	Football		
37	Artichoke		
38	Blouse		
39	Grasshopper		
40	Vest		
41	Turtle		
42	Hammer		
43	Fish		
44	Flag		
45	Sailboat		
46	Car		
47	Stool		
48	Basket		
49	Anchor		
50	Mitten		
Totals:			

No	item	response	code
51	Seal		
52	Fox		
53	Elephant		
54	French horn		
55	Ball		
56	Spoon		
57	Train		
58	Giraffe		
59	Tiger		
60	Necklace		
61	Tomato		
62	Cup		
63	Sled		
64	Cap		
65	Nose		
66	Lemon		
67	Wheel		
68	Ironing board		
69	Ring		
70	Clothes pin		
71	Bee		
72	Orange		
73	Gun		
74	Pen		
75	Window		
76	Cloud		
77	Toe		
78	Glove		
79	Kite		
80	Swan		
81	Fence		
82	Thimble		
83	Butterfly		
84	Chicken		
85	Toothbrush		
86	Helicopter		
87	Rocking chair		
88	Kettle		
89	Lamp		
90	Goat		
91	Squirrel		
92	Donkey		
93	Carrot		
94	Penguin		
95	Seahorse		
96	Rhinoceros		
97	Baby carriage		
98	Doll		
99	Racoon		
100	Cake		
Totals:			

S&V repetition page 1 Name: Date:

S&V repetition

No	item	response	code
101	Church		
102	Rolling pin		
103	Peacock		
104	Dress		
105	Boot		
106	Spinning wheel		
107	Paintbrush		
108	Rabbit		
109	Knife		
110	Thumb		
111	Chain		
112	Sweater		
113	Broom		
114	Moon		
115	Fork		
116	Pipe		
117	Axe		
118	Gorilla		
119	Eagle		
120	Accordion		
121	Hair		
122	Shirt		
123	Truck		
124	Book		
125	Pig		
126	Cat		
127	Door		
128	Sheep		
129	Snail		
130	Onion		
131	Drum		
132	Couch		
133	Belt		
134	Saltshaker		
135	Cannon		
136	Camel		
137	Rooster		
138	Table		
139	Kangaroo		
140	Finger		
141	Eye		
142	Top		
143	Airplane		
144	Mushroom		
145	Nail		
146	Bird		
147	Harp		
148	Envelope		
149	Iron		
150	Barn		
Totals:			

No	item	response	code
151	Balloon		
152	Television		
153	Umbrella		
154	Tree		
155	Needle		
156	Lock		
157	Leopard		
158	Horse		
159	Wrench		
160	Beetle		
161	Mouse		
162	Hat		
163	Sandwich		
164	Chair		
165	Bread		
166	Whistle		
167	Celery		
168	Cigarette		
169	Spool of thread		
170	Well		
171	Flower		
172	Bicycle		
173	Comb		
174	Roller skate		
175	Grapes		
176	Strawberry		
177	Skirt		
178	Light switch		
179	Suitcase		
180	Piano		
181	Mountain		
182	Cigar		
183	Desk		
184	Pot		
185	Traffic light		
186	Pocket book		
187	Zebra		
188	Bowl		
189	Arm		
190	Tie		
191	Brush		
192	Crown		
193	Garbage can		
194	Plug		
195	Pliers		
196	Snowman		
197	Button		
198	Ashtray		
199	Hanger		
200	Tennis racket		
Totals:			

S&V repetition page 2 Name: Date:

S&V repetition

No	item	response	code
201	Bottle		
202	Ruler		
203	Deer		
204	Asparagus		
205	Screw		
206	Coat		
207	Foot		
208	Record player		
209	Clock		
210	Baseball bat		
211	Glasses		
212	Toaster		
213	Sun		
214	Stove		
215	Bell		
216	Box		
217	Ostrich		
218	Telephone		
219	Refrigerator		
220	Watch		
221	Chisel		
222	Pepper		
223	Skunk		
224	Lobster		
225	Bear		
226	Frying pan		
227	Motorcycle		
228	Hand		
229	Nail file		
230	Arrow		
231	Dog		
232	Pitcher		
233	Screwdriver		
234	Caterpillar		
235	Fly		
236	Lips		
237	Spider		
238	Duck		
239	Pear		
240	Pineapple		
241	Guitar		
242	Sock		
243	Monkey		
244	Heart		
245	Candle		
246	Potato		
247	Lion		
248	Ear		
249	Key		
250	Windmill		
Totals:			

	item	response	code
251	Doorknob		
252	Wagon		
253	Ant		
254	Owl		
255	Alligator		
256	Leg		
257	Violin		
258	Pencil		
259	Apple		
260	Star		
Totals:			

Appendix 12

Seven Participants' Therapy Trial Word Sets

Table 1

p1's Three Thirty Word Therapy Trial Word Sets

variable	atherapy with word finding set	atherapy without word finding set	no therapy word finding control set
1	Baseball bat	Airplane	Artichoke
2	Bottle	Sailboat	Lettuce
3	Cannon	Helicopter	Onion
4	Balloon	Axe	Pencil
5	Doll	Nail	Pen
6	Kite	Ladder	Ruler
7	Cloud	Ball	Cigar
8	Star	Sled	Pipe
9	Sun	Bicycle	Ashtray
10	Button	Lobster	Glasses
11	Needle	Turtle	Necklace
12	Thimble	Seahorse	Ring
13	Bell	Ant	Clock
14	Drum	Bee	Lamp
15	Flute	Fly	Oven
16	Frying pan	Lightbulb	Ironing board
17	Kettle	Doorknob	Clothespin
18	Pot	Door	Broom
19	Chicken	Well	Bed
20	Ostrich	Flower	Dresser
21	Penguin	Fence	Chair
22	Apple	Barrel	Hat
23	Banana	Basket	Football helmet
24	Orange	Suitcase	Crown
25	Boot	Bread	Belt
26	Shoe	Cake	Blouse
27	Sock	Fish	Coat
28	Bowl	Arm	Giraffe
29	Cup	Ear	Leopard
30	Fork	Eye	Monkey

Appendix 12

Seven Participants' Therapy Trial Word Sets

Table 2

P2's Three Thirty Word Therapy Trial Word Sets

variable	atherapy with word finding set	atherapy without word finding set	no therapy word finding control set
1	Peacock	Lion	Camel
2	Cat	Tiger	Racoon
3	Mouse	Zebra	Squirrel
4	Chicken	Donkey	Barrel
5	Eagle	Horse	Basket
6	Ostrich	Cow	Suitcase
7	Arm	Barn	Bowl
8	Ear	Church	Cup
9	Eye	Windmill	Fork
10	Bread	Belt	Boot
11	Cake	Blouse	Roller Skate
12	Sandwich	Coat	Shoe
13	Dresser	Apple	Flower
14	Table	Lemon	Fence
15	Rocking Chair	Tomato	Watering Can
16	Clock	Clothes Pin	Door
17	Lamp	Broom	Door Knob
18	Record Player	Ironing Board	Lock
19	Bell	Key	Ant
20	Drum	Ring	Bee
21	Harp	Watch	Beetle
22	Brush	Frog	Cloud
23	Comb	Seal	Moon
24	Nail File	Turtle	Star
25	Button	Kettle	Ashtray
26	Needle	Pot	Cigar
27	Spool of Thread	Frying Pan	Cigarette
28	Pen	Ball	Corn
29	Ruler	Bicycle	Artichoke
30	Envelope	Tennis Racket	Asparagus

Appendix 12

Seven Participants' Therapy Trial Word Sets

Table 3

P3's Three Thirty Word Therapy Trial Word Sets

variable	atherapy with word finding set	atherapy without word finding set	no therapy word finding control set
1	Accordion	Helicopter	Ant
2	Bell	Sailboat	Bee
3	Harp	Train	Beetle
4	Guitar	Balloon	Caterpillar
5	Ironing Board	Top	Grasshopper
6	Bed	Bird	Barrel
7	Desk	Chicken	Basket
8	Dresser	Duck	Suitcase
9	Rocking Chair	Ostrich	Frying Pan
10	Stool	Penguin	Kettle
11	Pencil	Rooster	Pot
12	Ruler	Arm	Belt
13	Bowl	Eye	Blouse
14	Cup	Finger	Coat
15	Glass	Leg	Glove
16	Wineglass	Thumb	Mitten
17	Knife	Peach	Shirt
18	Bear	Pear	Tie
19	Skunk	Necklace	Vest
20	Rabbit	Artichoke	Turtle
21	Bicycle	Carrot	Seahorse
22	Football	Lettuce	Lobster
23	Tennis Racket	Mushroom	Barn
24	Lightbulb	Onion	Church
25	Light Switch	Potato	Windmill
26	Doorknob	Fence	Boot
27	Lock	Leaf	Roller Skate
28	Clock	Well	Shoe
29	Button	Peanut	Vase
30	Thimble	Sandwich	Spinning Wheel

Appendix 12

Seven Participants' Therapy Trial Word Sets

Table 4

P4's Three Thirty-One Word Therapy Trial Word Sets

variable	atherapy with word finding set	atherapy without word finding set	no therapy word finding control set
1	Helicopter	Ball	Penguin
2	Monkey	Sled	Finger
3	Rhinoceros	Tennis Racket	Air
4	Elephant	Ant	Heart
5	Giraffe	Bee	Leg
6	Chisel	Beetle	Couch
7	Nut	Grasshopper	Chair
8	Paintbrush	Spider	Desk
9	Wrench	Lobster	Stool
10	Ladder	Seahorse	Dresser
11	Screwdriver	Seal	Baseball Bat
12	Star	Turtle	Bottle
13	Cloud	Frying Pan	Cannon
14	Pocket Book	Cake	Celery
15	Suitcase	Fish	Onion
16	Roller Skate	Peanut	Pepper
17	Jacket	Accordion	Brush
18	Mitten	Flute	Nail File
19	Glove	French Horn	Toothbrush
20	Vest	Guitar	Bow
21	Cherry	Harp	Football Helmet
22	Peach	Trumpet	Arrow
23	Pear	Spinning Top	Traffic Light
24	Strawberry	Wagon	Doorknob
25	Watermelon	Deer	Lightbulb
26	Pineapple	Pig	Light Switch
27	Barn	Sheep	Window
28	Church	Pencil	Lock
29	Record Player	Ruler	Garbage Can
30	Racoon	Needle	Flower
31	Snake	Spool Of Thread	Watering Can

Appendix 12

Seven Participants' Therapy Trial Word Sets

Table 5

P5's Three Thirty Word Therapy Trial Word Sets

variable	atherapy with word finding set	atherapy without word finding set	no therapy word finding control set
1	Toe	Record Player	Roller Skate
2	Envelope	Cigarette	Sock
3	Pencil	Cigar	Shoe
4	Ruler	Doorknob	Basket
5	Zebra	Lightbulb	Barrel
6	Tiger	Light Switch	Pocket Book
7	Leopard	Window	Saltshaker
8	Rhinoceros	Thimble	Frying Pan
9	Iron	Rabbit	Peanut
10	Jacket	Skunk	Cake
11	Skirt	Snake	Tomato
12	Mitten	Camel	Watermelon
13	Vest	Snail	Pineapple
14	Glove	Racoon	Strawberry
15	Dress	Squirrel	Grapes
16	Belt	Necklace	Lemon
17	Butterfly	Umbrella	Tennis Racket
18	Caterpillar	Telephone	Sled
19	Balloon	Rooster	Football
20	Top	Penguin	Chisel
21	Wagon	Eagle	Screw
22	Kite	Swan	Screwdriver
23	Baseball Bat	Nail File	Saw
24	Cannon	Toothbrush	Wrench
25	Gun	Flute	Paint Brush
26	Artichoke	Piano	Ladder
27	Asparagus	Trumpet	Crown
28	Carrot	Guitar	Arrow
29	Celery	Accordion	Candle
30	Lettuce	Watering Can	Spinning Wheel

Appendix 12

Seven Participants' Therapy Trial Word Sets

Table 6

P6's Three Twenty-Four Word Therapy Trial Word Sets

variable	atherapy with word finding set	atherapy without word finding set	no therapy word finding control set
1	ladder	airplane	doorknob
2	paintbrush	bus	lightbulb
3	screw	car	light switch
4	screwdriver	lorry	lock
5	leopard	motorcycle	baseball bat
6	monkey	train	football
7	rhinoceros	lemon	tennis racket
8	bee	strawberry	dresser
9	grasshopper	watermelon	stool
10	spider	kettle	cap
11	artichoke	pot	bow
12	asparagus	rolling pin	lamp
13	mushroom	salt	record player
14	carrot	spoon	spinning top
15	bread	wineglass	wagon
16	cake	barrel	jacket
17	cloud	basket	mitten
18	moon	pocket book	pants
19	star	toe	skirt
20	necklace	nose	shirt
21	watch	thumb	waistcoat
22	barn	watering can	ostrich
23	French horn	spool of thread	mouse
24	piano	deer	rabbit

Appendix 12

Seven Participants' Therapy Trial Word Sets

Table 7

P7's Three Twenty-One Word Therapy Trial Word Sets

variable	atherapy With Word Finding Set	atherapy Without Word Finding Set	No Therapy Word Finding Control Set
1	Roller skate	Pitcher	Clothespin
2	Camel	Wineglass	Hanger
3	Racoon	Paintbrush	Ashtray
4	Rocking Chair	Pliers	Cigar
5	Desk	Wrench	Bird
6	Dresser	Celery	Chicken
7	Giraffe	Artichoke	Penguin
8	Monkey	Onion	Arrow
9	Spool of Thread	Seahorse	Baby Carriage
10	Thimble	Alligator	Candle
11	Top	Lips	Spinning Wheel
12	Wagon	Toe	Traffic Light
13	Peach	Finger	Bee
14	Banana	Toaster	Caterpillar
15	Strawberry	Refrigerator	Grasshopper
16	Grapes	Well	Barrel
17	Watermelon	Baseball Bat	Suitcase
18	Brush	Bottle	Football Helmet
19	Nail File	Cannon	Train
20	Comb	Tennis Racket	Bus
21	Envelope	Sled	Dress

Appendix 13

Proportion of Word Categories Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase

v	pathway	class	a1	a2	a3
p1	with/out	adjective	0.00	0.00	0.00
p2	out/with	adjective	1.67	0.33	0.33
p3	out/with	adjective	3.43	7.84	6.37
p4	with/out	adjective	2.33	2.00	1.67
p5	out/with	adjective	2.00	3.67	2.00
p6	out/with	adjective	5.67	5.00	2.33
p7	with/out	adjective	3.67	2.67	4.00

v	pathway	class	a1	a2	a3
p1	with/out	noun	0.00	0.00	0.97
p2	out/with	noun	5.33	10.67	10.67
p3	out/with	noun	5.39	13.24	18.14
p4	with/out	noun	9.33	7.00	6.67
p5	out/with	noun	7.33	10.33	7.33
p6	out/with	noun	5.33	7.00	3.00
p7	with/out	noun	9.00	8.33	4.67

v	pathway	class	a1	a2	a3
p1	with/out	adverb	0.00	0.00	0.00
p2	out/with	adverb	1.33	5.67	5.00
p3	out/with	adverb	4.41	3.92	5.39
p4	with/out	adverb	8.67	12.67	17.00
p5	out/with	adverb	10.67	13.00	9.67
p6	out/with	adverb	10.33	10.33	5.67
p7	with/out	adverb	11.67	12.33	5.00

v	pathway	class	a1	a2	a3
p1	with/out	numeral	0.00	0.00	0.00
p2	out/with	numeral	16.00	7.33	12.33
p3	out/with	numeral	0.98	0.98	0.49
p4	with/out	numeral	3.00	0.00	2.67
p5	out/with	numeral	2.00	1.33	1.00
p6	out/with	numeral	0.67	2.33	1.00
p7	with/out	numeral	0.67	0.00	0.00

v	pathway	class	a1	a2	a3
p1	with/out	article	0.00	0.00	0.00
p2	out/with	article	0.00	0.33	0.33
p3	out/with	article	0.98	0.49	0.49
p4	with/out	article	2.33	1.33	1.33
p5	out/with	article	3.00	3.67	3.00
p6	out/with	article	3.33	3.33	1.67
p7	with/out	article	5.67	2.67	3.00

v	pathway	class	a1	a2	a3
p1	with/out	preposition	0.00	0.00	0.97
p2	out/with	preposition	0.67	0.33	0.33
p3	out/with	preposition	0.00	1.47	0.00
p4	with/out	preposition	6.33	6.33	4.00
p5	out/with	preposition	2.67	2.00	1.33
p6	out/with	preposition	2.33	0.33	1.67
p7	with/out	preposition	5.33	2.33	3.00

v	pathway	class	a1	a2	a3
p1	with/out	conjunction	0.00	0.00	0.00
p2	out/with	conjunction	9.33	10.67	12.00
p3	out/with	conjunction	1.96	2.94	1.96
p4	with/out	conjunction	6.00	6.00	5.33
p5	out/with	conjunction	6.33	5.67	6.67
p6	out/with	conjunction	7.67	8.67	10.00
p7	with/out	conjunction	9.00	15.67	9.00

v	pathway	class	a1	a2	a3
p1	with/out	pronoun	0.00	0.00	0.97
p2	out/with	pronoun	14.33	10.33	12.33
p3	out/with	pronoun	6.86	5.39	7.84
p4	with/out	pronoun	25.33	25.67	23.33
p5	out/with	pronoun	20.00	17.33	20.00
p6	out/with	pronoun	23.67	24.00	22.33
p7	with/out	pronoun	20.67	21.33	30.67

v	pathway	class	a1	a2	a3
p1	with/out	determiner	0.00	0.00	0.00
p2	out/with	determiner	0.00	0.00	0.00
p3	out/with	determiner	0.49	0.98	1.47
p4	with/out	determiner	3.00	1.00	1.00
p5	out/with	determiner	2.33	1.67	0.67
p6	out/with	determiner	1.00	0.33	0.33
p7	with/out	determiner	1.33	1.33	0.67

v	pathway	class	a1	a2	a3
p1	with/out	verb	0.00	0.00	0.00
p2	out/with	verb	14.00	11.00	12.67
p3	out/with	verb	12.75	7.84	13.73
p4	with/out	verb	24.67	33.00	29.67
p5	out/with	verb	25.33	27.00	23.67
p6	out/with	verb	20.67	22.33	27.00
p7	with/out	verb	23.33	24.00	28.00

v	pathway	class	a1	a2	a3
p1	with/out	miscellaneous	100	100	97.09
p2	out/with	miscellaneous	37.33	43.33	34.00
p3	out/with	miscellaneous	62.75	54.90	44.12
p4	with/out	miscellaneous	9.00	5.00	7.33
p5	out/with	miscellaneous	18.33	14.33	24.67
p6	out/with	miscellaneous	19.33	16.33	25.00
p7	with/out	miscellaneous	9.67	9.33	12.00

Appendix 14

Proportion of Phrase Types Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	adjective	0.00	0.00	0.00
p2	out/with	adjective	0.00	0.88	1.12
p3	out/with	adjective	9.43	13.04	11.83
p4	with/out	adjective	1.21	1.16	0.54
p5	out/with	adjective	1.94	4.38	1.25
p6	out/with	adjective	5.49	7.47	4.14
p7	with/out	adjective	1.76	4.22	3.24

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	adverb	0.00	0.00	0.00
p2	out/with	adverb	3.74	15.79	16.80
p3	out/with	adverb	3.77	10.14	5.38
p4	with/out	adverb	13.33	16.28	20.97
p5	out/with	adverb	10.32	9.38	11.25
p6	out/with	adverb	15.24	13.79	6.21
p7	with/out	adverb	16.47	15.06	5.95

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	noun	0.00	0.00	66.67
p2	out/with	noun	57.94	56.14	68.32
p3	out/with	noun	49.06	53.62	56.99
p4	with/out	noun	49.09	45.93	44.09
p5	out/with	noun	48.39	46.88	49.38
p6	out/with	noun	45.73	50.00	50.34
p7	with/out	noun	42.94	46.39	52.43

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	preposition	0.00	0.00	33.33
p2	out/with	preposition	0.93	0.88	0.00
p3	out/with	preposition	0.00	2.90	0.00
p4	with/out	preposition	9.09	6.98	4.30
p5	out/with	preposition	4.52	3.75	1.88
p6	out/with	preposition	3.05	0.00	2.07
p7	with/out	preposition	7.06	3.61	4.32

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	verb	0.00	0.00	0.00
p2	out/with	verb	37.38	26.32	39.20
p3	out/with	verb	37.74	20.29	25.81
p4	with/out	verb	27.27	29.65	30.11
p5	out/with	verb	34.84	35.63	36.25
p6	out/with	verb	30.49	28.74	37.24
p7	with/out	verb	31.76	30.72	34.05

Appendix 15

Longest Type of Phrase Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	adjective	0	0	0
p2	out/with	adjective	3	5	6
p3	out/with	adjective	1	3	2
p4	with/out	adjective	2	3	6
p5	out/with	adjective	3	4	2
p6	out/with	adjective	5	4	1
p7	with/out	adjective	3	3	3

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	adverb	0	0	0
p2	out/with	adverb	3	5	6
p3	out/with	adverb	1	3	2
p4	with/out	adverb	4	3	6
p5	out/with	adverb	3	4	2
p6	out/with	adverb	5	4	1
p7	with/out	adverb	3	3	3

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	noun	0	0	1
p2	out/with	noun	2	3	3
p3	out/with	noun	2	2	3
p4	with/out	noun	2	3	4
p5	out/with	noun	2	2	4
p6	out/with	noun	3	4	5
p7	with/out	noun	3	4	6

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	preposition	0	0	1
p2	out/with	preposition	1	1	0
p3	out/with	preposition	0	1	0
p4	with/out	preposition	4	3	3
p5	out/with	preposition	3	2	3
p6	out/with	preposition	4	0	3
p7	with/out	preposition	5	2	3

variable	pathway	type of phrase	a1	a2	a3
p1	with/out	verb	0	0	0
p2	out/with	verb	1	2	1
p3	out/with	verb	3	3	3
p4	with/out	verb	4	6	5
p5	out/with	verb	4	4	4
p6	out/with	verb	4	3	4
p7	with/out	verb	5	5	4

Appendix 16

Clause Level Raw Data Produced by Each Participant in Equivalent Extracts Taken from Therapy Experience Interviews Conducted During Each Assessment Phase

v	pathway	time	clause length						total number clauses	word to clause ratio	relative clauses	subordinate clauses	most frequent clause	longest clause
			1	2	3	4	5	6						
p1	with/out	a1												
	with/out	a2												
	with/out	a3												
p2	out/with	a1	5	26	5	2			38	12.67			sv	4
	out/with	a2		16	14				30	10.00		1	sv	3
	out/with	a3	2	25	11	1			39	13.00		2	sv	4
p3	out/with	a1	2	12	4				18	8.82			sv	3
	out/with	a2	1	5	7				13	6.37			svc & va	3
	out/with	a3	4	13	4	1			22	10.78		2	sv	4
p4	with/out	a1	2	11	24	9	3	1	50	16.67	5	7	sv	6
	with/out	a2	2	17	24	11		1	55	18.33	10	5	sv	6
	with/out	a3		24	19	11	2		56	18.67	7	8	sv	5
p5	out/with	a1	4	25	16	5			50	16.67	10	12	sv	4
	out/with	a2	6	18	20	6	2		52	17.33	7	8	sv	5
	out/with	a3	4	19	15	5	2		45	15.00	4	13	sv	5
p6	out/with	a1	3	20	15	7	2		47	15.67	5	2	sv	5
	out/with	a2		20	25	3			48	16.00	3	1	sv	4
	out/with	a3	8	25	15	4			52	17.33	3	4	sv	4
p7	with/out	a1	1	14	23	8			46	15.33	11	4	sv	4
	with/out	a2	1	17	23	8			49	16.33	4	4	sv	4
	with/out	a3	4	33	23	3			63	21.00	16	2	sv	4

Appendix 17

Proportion of Phrases Produced After Activation Therapy with Word Finding and Activation Therapy Without Word Finding Sessions in Equivalent Extracts Taken from Therapy Experience Interviews Conducted After Each Type of Therapy with Each Participant

variable	pathway	all phrase types	baseline	post activation therapy
p1	with/out	after atherapy with word finding	0.00	0.00
p2	out/with	after atherapy with word finding	38.00	37.33
p3	out/with	after atherapy with word finding	33.82	45.59
p4	with/out	after atherapy with word finding	55.00	57.33
p5	out/with	after atherapy with word finding	53.33	53.33
p6	out/with	after atherapy with word finding	58.00	48.33
p7	with/out	after atherapy with word finding	56.67	55.33

variable	pathway	phrase	baseline	post activation therapy
p1	with/out	after atherapy without word finding	0.00	2.91
p2	out/with	after atherapy without word finding	35.67	38.00
p3	out/with	after atherapy without word finding	25.98	33.82
p4	with/out	after atherapy without word finding	57.33	62.00
p5	out/with	after atherapy without word finding	51.67	53.33
p6	out/with	after atherapy without word finding	54.67	58.00
p7	with/out	after atherapy without word finding	55.33	61.67

Note. atherapy = activation therapy.

Appendix 18

Participants' a3 and Leech et al. (2009) proportion of word use

p	word class	proportion a3	Leech et al. (2009)	p	word class	proportion a3	Leech et al. (2009)
p1	adverb	0.00	5.88	p5	adverb	9.67	5.88
p1	article	0.00	10.86	p5	article	3.00	10.86
p1	adjective	0.00	7.95	p5	adjective	2.00	7.95
p1	conjunction	0.00	5.56	p5	conjunction	6.67	5.56
p1	determiner	0.00	2.93	p5	determiner	0.67	2.93
p1	miscellaneous	97.09	4.28	p5	miscellaneous	24.67	4.28
p1	noun	0.97	26.39	p5	noun	7.33	26.39
p1	numeral	0.00	1.54	p5	numeral	1.00	1.54.
p1	preposition	0.97	11.71	p5	preposition	1.33	11.71
p1	pronoun	0.97	5.33	p5	pronoun	20.00	5.33
p1	verb	0.00	17.70	p5	verb	23.67	17.70
p2	adverb	5.00	5.88	p6	adverb	5.67	5.88
p2	article	0.33	10.86	p6	article	1.67	10.86
p2	adjective	0.33	7.95	p6	adjective	2.33	7.95
p2	conjunction	12.00	5.56	p6	conjunction	10.00	5.56
p2	determiner	0.00	2.93	p6	determiner	0.33	2.93
p2	miscellaneous	34.00	4.28	p6	miscellaneous	25.00	4.28
p2	noun	10.67	26.39	p6	noun	3.00	26.39
p2	numeral	12.33	1.54.	p6	numeral	1.00	1.54.
p2	preposition	0.33	11.71	p6	preposition	1.67	11.71
p2	pronoun	12.33	5.33	p6	pronoun	22.33	5.33
p2	verb	12.67	17.70	p6	verb	27.00	17.70
p3	adverb	5.39	5.88	p7	adverb	5.00	5.88
p3	article	0.49	10.86	p7	article	3.00	10.86
p3	adjective	6.37	7.95	p7	adjective	4.00	7.95
p3	conjunction	1.96	5.56	p7	conjunction	9.00	5.56
p3	determiner	1.47	2.93	p7	determiner	0.67	2.93
p3	miscellaneous	44.12	4.28	p7	miscellaneous	12.00	4.28
p3	noun	18.14	26.39	p7	noun	4.67	26.39
p3	numeral	0.49	1.54.	p7	numeral	0.00	1.54
p3	preposition	0.00	11.71	p7	preposition	3.00	11.71
p3	pronoun	7.84	5.33	p7	pronoun	30.67	5.33
p3	verb	13.73	17.70	p7	verb	28.00	17.70
p4	adverb	17.00	5.88				
p4	article	1.33	10.86				
p4	adjective	1.67	7.95				
p4	conjunction	5.33	5.56				
p4	determiner	1.00	2.93				
p4	miscellaneous	7.33	4.28				
p4	noun	6.67	26.39				
p4	numeral	2.67	1.54.				
p4	preposition	4.00	11.71				
p4	pronoun	23.33	5.33				
p4	verb	29.67	17.70				

Appendix 19

Percentage of unique words used by each participant at each assessment point

p	a1 percentage	a2 percentage	a3 percentage
p1	1.94	2.91	4.85
p2	86.33	89.00	81.33
p3	90.20	58.82	89.71
p4	90.00	88.00	94.33
p5	69.67	70.33	85.00
p6	83.67	90.67	85.67
p6	87.00	84.67	97.33

Appendix 20

Interview Analyses Participants, ttps and Interviewer, Time, Words and Mean Length of Utterance

Interview Time and Total Words and Mean Length of Utterance of Participant and Therapy Trial Partners

variable	p1	p2	p3	p4	p5	p6	p7	ttp1	ttp2	ttp3	ttp4	ttp5	ttp6	ttp7
total seconds														
a1	1061	1664	1469	1036	479	688	545	1383	1006	724	668	1011	902	925
a2	1155	2414	1566	834	916	1388	1145	764	688	737		841	655	597
a3	915	2689	2108	954	1295	1633	553	897	901	655	534		636	894
total words														
a1	103	1090	204	1316	468	1645	1090	2849	3131	1755	1313	2709	1727	1834
a2	144	1721	358	1057	578	838	2183	1392	2162	1627		1940	1410	11368
a3	110	1649	535	1044	851	1035	955	1937	2417	1341	1181		1323	1769
total turns														
a1	86	256	172	104	58	249	18	37	32	25	42	54	34	15
a2	170	381	232	75	75	99	59	29	57	26		40	16	10
a3	109	500	304	83	93	109	15	26	92	22	22		25	27
mean length of turn														
a1	1.20	4.22	1.19	12.65	8.07	6.58	60.56	77.00	59.08	70.20	31.26	47.53	50.79	122.27
a2	0.85	4.52	1.80	14.09	7.71	8.30	36.38	48.00	25.44	62.58		48.50	88.13	136.80
a3	1.01	3.29	1.79	12.73	8.96	9.50	63.67	75.50	25.99	60.95	102.70		52.92	65.52

Note. p = participant ttp = therapy trial partner.

Mann Whitney U test Used to Compare Interview Times in Seconds, the Number of Words, the Number of Turns and the Mean Length of Turn Used by Participants and Their Therapy Trial Partner

Variable	participants' median	therapy trial partners' median	Z	2-tailed	effect size
time in seconds	1145	764	-2.898	0.00	0.22
number of words	955	1755	-4.293	0.00	0.46
number of turns	104	27	-5.404	0.00	0.79
mean length of turn	7.71	60.95	-4.780	0.00	0.59

Interview Time and Total Words and Mean Length of Utterance used by the Interviewer in Interviews with Participant and Therapy Trial Partners

variable	ip1	ip2	ip3	ip4	ip5	ip6	ip7	ittp1	ittp2	ittp3	ittp4	ittp5	ittp6	ittp7
total seconds														
a1	1061	1664	1469	1036	479	688	545	1383	1006	724	668	1011	902	925
a2	1155	2414	1566	834	916	1388	1145	764	688	737		841	655	597
a3	915	2689	2108	954	1295	1633	553	897	901	655	534		636	894
total words														
a1	2046	2286	2382	891	502	1512	218	434	209	327	364	371	294	239
a2	2183	3222	2282	487	565	704	484	317	426	310		426	180	173
a3	1572	3515	3348	700	827	822	152	329	649	329	265		257	400
total turns														
a1	84	267	180	104	61	239	19	40	33	27	40	58	38	16
a2	166	394	238	67	74	106	60	33	58	25		43	17	10
a3	108	502	298	85	95	110	16	26	91	25	16		24	30
mean length of turn														
a1	24.36	8.47	13.16	8.57	7.97	6.33	11.47	10.85	6.33	12.11	9.10	6.29	7.74	14.94
a2	12.99	8.03	19.10	7.27	7.64	6.64	8.07	9.61	7.10	12.40		19.14	10.59	17.30
a3	14.56	6.99	11.23	8.05	8.71	7.21	9.50	12.65	7.05	13.16	10.19		10.71	12.12

Note. I = interviewer.

Mann Whitney U test Used to Compare the Number of Words, the Number of Turns and the Mean Length of Turn Used by the Interviewer in Interviews with Participants and Their Therapy Trial Partners

Variable	interviewer with participants' median	interviewer with therapy trial partners' median	Z	2-tailed	effect size
number of words	891.00	327.00	-4.347	0.00	0.48
number of turns	106	30	-4.376	0.00	0.49
mean length of turn	8.47	10.71	-0.962	0.344	n/a

Appendix 21

Summary of Issues Discussed and Their Translation into The Four Main Thematic Analysis Themes

Talking is Better, Self, Close Others, Other Others

issues discussed	codes	sub themes	theme
speech is everything			
others don't understand			
wilderness	impact of aphasia		
physical problems are not as bad			
speech problems last longer		aphasia affects everything	
understanding hard			
words are hard to get	aphasia is		
hard to overcome word finding difficulties			
therapy has been of benefit			
getting better			
good direction	positive changes		
working			
good			
finding more words			
quicker			
more easily loosens tongues	word accessing better		
not slipping up so much			
words get better			
perseveres more			
self cues			
putting words together better			
sentences are better	phrases and sentences better		
getting more out			
		language is better	talking is better
writes words			
reading	multimodality language use better		
non vocal			
signs coming back			
participates more			
conversations good	more and better conversations		
having conversations			
others have noticed the change			
colloquialisms			
can be concise			
can express humour	enhanced pragmatics		
can have an argument now			
can express his independence			
adapting to needs of others			
want speech back			
recovery slow but still happening			
hard working	a different type of person with aphasia?		
getting somewhere			
hopeful		therapy may not be right for everyone	
realistic but different expectations			
therapy is tiring	negative therapy effects		
therapy made the difference	positive therapy effects		

Issues discussed	codes	sub-themes	theme
not normal not as good not 100% limited like a child turn the clock back	negative associations	dissatisfaction with consequences of aphasia	
affects confidence means anxiety and fear frustration and anger feelings difficult to manage need language to self-regulate	negative emotions	aphasia and emotional state are intertwined	
the same inside stoic hard working	positive associations	inherent competence of PWA	regaining lost self
more her/him better in themselves	more themselves	return to more of self	
not as frustrated stronger more confident happier renewed enthusiasm hoping	positive emotions	regaining positive emotions	
better at self-regulating emotions memory better thinking is happening	thinking is better	aspects of improved cognition	
understands another’s perspective	looking outside self		

issues discussed	codes	sub themes	theme
loved ones accept them PWA viewed with positive regard	loved		
safe people he knows safe people with similar differences	need to feel safe	small social sphere in which accepted safe and loved	
close others have gone small social sphere accept them	acceptance		
talking to PWA takes time PWA can't discuss things difficult for both parties	conversation is difficult	aphasia affect conversation with those who accept them	
affects marriages and family	affects relationships with family and friends		
carers not relatives puts a lot of onus on others	onus on family		
can't run your own life affects privacy and dignity	lack of control	close others accept being in charge of PWA out of necessity	
likes to do things – not always able saving face	being looked after		
cheated	feel cheated		alleviating reliance on close others
need to do something aphasia makes doing something hard not the calibre of activity	need activity	need to find something to do	
therapy scarce want more therapy private	therapy is activity	therapy is activity	
can't talk about it anyway dissatisfied with therapy	therapy not transparent and accountable		
more independent doing more and completing things helping others	therapy helped to do more	better activity of PWA	
therapy is an ingredient therapy is enjoyable and rewarding	positive force in life		
somebody different	extends friendship group	therapist extends the small inner circle	
not stuck small community	changed horizons	outward looking	

Issues discussed	codes	sub-themes	theme
can't work can't be socially active real world can't fit in can't hear multiple conversations	can't fit in to the real world that others inhabit	don't fit into the real world	
not worthy enough scared feel rejected embarrassed frightened bored?	negative emotions about not fitting in	reciprocal rejection	re engage with other others
others don't understand need to make allowances but don't	people should help but don't		
bollocks to them	reject those people		
made new friends strategising how to communicate	friendship and socialisation	engaging with others	